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Hedge Fund Franchises

William Fung, David Hsieh, Narayan Naik, Melvyn Teo*

Abstract

We investigate the growth strategies of hedge fund firms. We find that firms with successful first funds are able to launch follow-on funds that charge higher performance fees, set more onerous redemption terms, and attract greater inflows. Motivated by the aforementioned spillover effects, first funds outperform follow-on funds, after adjusting for risk. The multiple-product growth strategy hurts investors while benefitting hedge fund firms; multiple-product firms underperform single-product firms but harvest greater fee revenues. Investors respond to this growth strategy by redeeming from first funds of firms with follow-on funds that do poorly. Moreover, skilled investors allocate more capital to first than to follow-on hedge funds. Empirically, the multiple-product firm has become the dominant business model for the hedge fund industry.

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1. Introduction

"The Board's point of view is that at its essence the Man Group's strategy is a growth strategy. ... And when we're looking therefore at each aspect of our business, we have to be able to grow it. We have to be able to scale it."

– Kevin Hayes, Man Group [1]

Hedge funds collectively managed over US$3 trillion in assets in 2016.[2] Institutional investors have grown to become the dominant investor clientele in this industry.[3] Concomitantly, increased regulatory and compliance costs, as well as a heightened pressure to lower hedge fund fees, have ratcheted up the critical mass needed for a hedge fund firm to sustain operations with management fee revenues.[4] Therefore, it has become imperative for hedge fund firms to grow in order to attract large institutional investors and to spread the higher fixed costs over a larger asset base. While recent academic work has emphasized how the incentives of hedge fund managers motivate asset growth (Lim, Sensoy, and Weisbach, 2016; Yin, 2016), the question remains: how do hedge fund firms grow?

Our paper fills this gap by focusing on the behaviour of hedge fund firms who have managed to create a track record and who now face a choice of growth strategy. We start with the observation that hedge fund firms often operate multiple funds, and not all funds managed by a hedge fund firm command the same regard from investors. Anecdotal evidence suggests that the reputation of a multiple-fund firm rests heavily on the performance of its

[1] See Pozen and Clay (2012, p. 6).

[2] See https://www.barclayhedge.com/research/indices/ghs/mum/HF_Money_Under_Management.html.

[3] See "Hedge funds must grapple with shifting balance of power," Financial Times, 25 August 2015, for a discussion on the institutionalization of the hedge fund industry.

[4] According to Troy Gayeski, partner at SkyBridge, a New York-based fund of funds, "Ten years ago a hedge fund with $50m of assets could generate plenty of revenue to cover overheads. These days it has to be $500m, and part of the reason is that regulatory requirements have gone up dramatically." See "Hedge funds move to family offices is not entirely popular," Financial Times, 23 October 2015. For a discussion on fees see "Hedge funds cut fees to stem client exodus," Financial Times, 18 December 2015, and "Calpers to pare external managers," Wall Street Journal, 8 June 2015.

first fund.[5] Having started her first fund, in order to grow her business, a hedge fund manager faces two choices. She could (i) simply grow the assets under management (henceforth AUM) of a single commingled fund or product, or (ii) offer multiple funds or products. Which of these two options is the preferred one? Do hedge fund firms leverage off the stellar performance of their first funds to launch additional funds? Do the capital raising activities of multiple-product firms benefit investors? How do such activities impact the total fee revenue of the hedge fund firm? And how do investors respond to firms that launch multiple products?

Our results are striking. We find that hedge fund firms with successful first funds launch follow-on funds that charge higher performance fees, set more onerous redemption terms, and attract greater inflows. These effects prevail after controlling for the performance of the other follow-on funds launched by the same firm. Indeed, past first fund performance predicts future flows into follow-on funds over and above the explanatory power of their respective track records. Thus, our empirical results suggest that there is a spillover effect from a successful first fund and it is an important consideration to hedge fund managers in their capital raising campaigns.

In light of the positive spillover effects engendered by first funds, are managers incentivized to deliver better performance with the earlier funds launched by their firms? We find that first funds outperform follow-on funds by 1.88 percent per annum after adjusting for covariation with the Fung and Hsieh (2004) seven factors and controlling for the other variables that can explain fund performance. The effect is statistically significant at the one percent level. Moreover, the difference between first and follow-on fund performance is even stronger for the follow-on funds that are launched later. The abnormal return spread between the first and the second to fifth funds launched is a statistically reliable but economically mod-

[5]For example, the Financial Times reported that Man Group's stock rose buoyed by the outperformance of its first fund, AHL. See "Man Group outperforms as first fund sparkles," Financial Times, 24 September 2011. Similarly, the Wall Street Journal reported that BlueCrest plans to stop managing money for outside clients after a run of poor returns and client redemptions from its first fund, BlueCrest Capital International. See "BlueCrest capital decides to go private," Wall Street Journal, 2 December 2015.

est 1.79 percent, while the analogous spread between the first and the eleventh to twentieth funds launched is an impressive 3.45 percent per year. These findings cannot be explained by differences in fund share restrictions and illiquidity (Aragon, 2007; Aragon and Strahan, 2012), fund fees (Agarwal, Daniel, and Naik, 2009), age (Aggarwal and Jorion, 2010), size (Berk and Green, 2004), return smoothing behavior (Getmansky, Lo, and Makarov, 2004), and backfill and incubation bias (Liang, 2000; Bhardwaj, Gorton, and Rouwenhorst, 2014).

Hedge fund investors do not benefit from the capital raising activities of multiple-product firms. Portfolio sorts indicate that multiple-product firms on average underperform single-product firms by a statistically reliable 3.77 percent per annum after adjusting for risk. Yet, despite underperforming single-product firms, multiple-product firms are able to generate significantly greater total fee revenue than their single-product counterparts. In particular, multiple-product firms harvest fee revenues that are on average US$21.68 million per annum higher than that harvested by single-product firms. The larger size of the multiple-product firms explains much of the difference in fee revenue.[6]

Empirical evidence shows that the outperformance of the first fund is driven by strong initial performance, which moderates after the launch of the first follow-on fund. Prior to follow-on fund launches, first funds of multiple-product firms deliver a return of 10.83% per year after adjusting for risk. However, upon the launch of the first follow-on fund, first funds' alpha deteriorates by 5.35% per annum. The reduction in performance is 1.92% greater than that for comparable first funds at other firms. Instead of protecting the first fund's performance by limiting its AUM growth, multiple-product firms typically grow AUM across all products, i.e., first as well as follow-on. This in part explains the performance deterioration of multiple-product firms once they embark on an asset-gathering strategy.

Investors' confidence in firms with successful first funds is not completely misplaced. Stellar first fund performance is associated with better subsequent follow-on fund and first

[6]In the paper, we principally label as multiple-product firms, those with multiple funds. That said, our results prevail when we define as multiple-product firms, those with multiple distinct strategies. Specifically, firms with uncorrelated strategies underperform those with one strategy (or correlated strategies), but harvest greater fee revenues.

fund performance. We find that on average, a one percentage point increase in the first fund's monthly alpha in the 12-month period prior to the launch of the first follow-on fund precipitates a 13.6 basis point increase in follow-on fund monthly alpha, and a 12.6 basis point increase in the first fund monthly alpha, in the 12-month post launch period. Therefore, it seems that investors who subscribe to a new fund launched by a hedge fund firm with a stellar first fund are responding rationally to the positive outlook that such an event is signaling at the beginning of the firm's capital raising campaign.

Just as stellar performance of the first fund can help capital raising for the firm, poor performance of follow-on funds can be detrimental to this process. We find evidence of a significant blowback effect from follow-on funds to the first fund. Lower follow-on fund returns over the past one and two years are associated with lower flows into the first fund of the same hedge fund firm after controlling for past first fund returns. This blowback effect suggests that firms need to balance quantity with quality when embarking on such a growth path.

Finally, skilled investors appear cognizant of the implications of this growth strategy. We show that, consistent with the view that some hedge fund investors possess investment skill, funds of hedge funds (henceforth FoFs) with high past alpha t-statistics subsequently outperform FoFs with low past alpha t-statistics.[7] Relative to the unskilled investors (i.e., the bottom decile of FoFs based on past alpha t-statistics), skilled investors (i.e., the top decile of FoFs based on past alpha t-statistics) load more on the first funds than on the follow-on funds launched by hedge fund firms.

The results in this paper resonate with two strands of research on hedge funds. The first strand sheds light on hedge fund alpha and finds that incentivized (Agarwal, Daniel, and Naik, 2009), geographically proximate (Teo, 2009), emerging (Aggarwal and Jorion, 2010), and distinctive (Sun, Wang, and Zheng, 2012) hedge funds deliver higher alpha. We show that hedge funds that are conceived earlier by their firms also outperform.[8] The second strand

[7]This is analogous to a sort on fund information ratio.

[8]Unlike Aggarwal and Jorion (2010) who analyze the impact of time since fund launch on performance,

examines agency problems and finds that some hedge funds strategically delay reporting poor performance (Aragon and Nanda, 2017), inflate their December returns (Agarwal, Daniel, and Naik, 2011), and take on excessive liquidity risk (Teo, 2011).[9] We find that consistent with the agency view, better incentive alignment via manager co-investment helps ameliorate the tendency of hedge fund firms to launch follow-on funds that underperform first funds.

This paper echoes research on the strategic behavior of mutual fund families (Massa, 2003; Nanda, Wang, and Zheng, 2004; Gaspar, Massa, and Matos, 2006; Sialm and Tham, 2016). While Massa (2003) investigates the relationship between the performance of a mutual fund family in a category and the degree of product differentiation in the category, we study the link between the performance of a hedge fund firm and the degree of fund or strategy proliferation in the firm itself. Unlike Nanda, Wang, and Zheng (2004), who document positive spillover effects in the form of greater flows to the other mutual funds of families with stars, we show that for hedge funds intra-firm spillover effects extend beyond flows to include fees, redemption terms, and performance.

Our work complements Kolokolova (2011) and Yin (2016). Kolokolova (2011) finds that hedge fund firms with high past returns are more likely to launch new funds and attract inflows. She does not differentiate between first and follow-on funds. We believe that focusing on first funds is critical as stellar first fund performance allows a firm to transition from a single-product to a multiple-product firm. Yin (2016) argues that the hedge fund management compensation contract induces individual hedge funds to grow beyond that which is optimal for fund performance. While Yin (2016) focuses on the growth of the individual hedge fund, we focus on the growth of the hedge fund firm.

Relative to Kolokolova (2011) and Yin (2016), we deepen our understanding of firm strategic behavior by (i) documenting intra-firm spillover effects from first funds to follow-on funds and vice-versa (i.e., the blowback flow effect), (ii) uncovering the relationship

we investigate the association between the launch order of funds within firms and performance.

[9] Jorion and Schwarz (2014) argue that the discontinuity at zero in the hedge fund net return distribution documented by Bollen and Pool (2009) is not evidence of manager manipulation.

between fund launch order and performance, (iii) exploring intra-firm fund performance persistence, (iv) testing the impact of firm strategy diversification on fund performance, and (v) understanding the preference by hedge fund investors for first versus follow-on funds. By finding evidence of intra-firm performance persistence, we resolve the conundrum raised by Kolokolova (2011) about the apparent irrationality of fund investors that respond to short-lived firm performance. Our results suggest that stellar first fund performance not only allows first funds to grow capital beyond the optimal point, as in Yin (2016), but also allows their management company to do likewise via the launch of follow-on funds. Consequently, the indirect incentives facing hedge fund managers, especially those managing first funds, are likely to be even stronger those that suggested by Lim, Sensoy, and Weisbach (2016).

We note that the endogeneity of firm growth strategy does not explain the underperformance of hedge funds launched later by firms. The multivariate regression methodology that we employ allows us to sidestep concerns that observed differences between funds managed by single- and multiple-product firms explain our results. To cater for unobserved differences between single- and multiple-product firms, we run an instrumental variables analysis with the supply of investment capital at firm founding as the instrument. We find that first funds outperform follow-on funds even more after instrumenting for firm growth strategy. Similarly, the more general result that the later funds launched by firms underperform the earlier funds prevails after instrumenting for firm multiple-product status. Our choice of instrument follows Asker, Farre-Mensa, and Ljungqvist (2015) and is robust to alternative specifications.

The remainder of this paper is organized as follows. Section 2 describes the data and methodology. Section 3 reports the results from the empirical analysis while Section 4 presents a series of robustness tests. Section 5 concludes.

2. Data and methodology

We evaluate hedge funds using monthly net returns and AUM data of live and dead hedge funds reported in the TASS, HFR, and BarclayHedge datasets from January 1990 to December 2013.[10] Because TASS, HFR and BarclayHedge started distributing their data in 1994, the data sets do not contain information on funds that died before December 1993. This gives rise to survivorship bias. We mitigate this bias by focusing on data from January 1994 onward.

In our fund universe, we have a total of 16,828 hedge funds, of which 5,633 are live funds and 11,195 are dead funds. The funds are roughly evenly split between the three databases. While 1,704 funds appear in all three databases and 3,256 funds appear in two databases, many funds belong to only one database. Specifically, there are 3,729 funds, 3,735 funds, and 4,404 funds peculiar to the TASS, HFR, and BarclayHedge databases, respectively. This highlights the advantage of obtaining data from multiple sources. In our analysis, we focus on the sample of funds without duplicate share classes due to concerns that funds with multiple share classes could cloud the analysis.[11] Removing duplicate share classes from the sample leaves us with a total of 15,607 hedge funds, of which 5,269 are live funds and 10,338 are dead funds.

We define first funds as the first fund launched by each hedge fund firm. Follow-on funds are the other funds launched by hedge fund firms. To determine fund status, we sort our sample of funds based on fund inception date within the firm. To ensure that there is only one first fund per firm, when more than one fund is launched in the same month by a firm, we merge them to form a composite fund and treat it as that firm's first fund.[12] The fund

[10] The results are robust to using pre-fee returns.

[11] If a hedge fund firm has an onshore and offshore fund pair, we drop the offshore fund, essentially treating it like a duplicate share class. We also find that our baseline results do not change if we drop the onshore fund in those cases. Our findings are therefore not driven by differences between the onshore and offshore duplicate of the same fund (Aragon, Liang, and Park, 2014).

[12] Of the 6,882 firms in our sample, 6,387 have a single first component fund while only 495 have multiple first component funds. In other words, 93 percent of the firms in our sample started with only one fund. The average number of first component funds per firm is 1.087. In lieu of forming composite first funds, we cater

attributes and monthly returns of the composite fund are simply the average fund attribute and average monthly returns of its component funds, respectively. The monthly AUM of the composite fund is the sum of the monthly AUM of its component funds.

Following Joenväärä, Kosowski, and Tolonen (2017), we classify hedge funds into 12 investment styles: Commodity Trading Advisor, Emerging Markets, Event Driven, Global Macro, Long Only, Equity Long/Short, Market Neutral, Multi-Strategy, Relative Value, Sector, Short Bias, and Others. Table 1 breaks down the funds in the sample by investment strategy and reports the first and follow-on fund distribution as well as the number of live and dead funds in each strategy. To facilitate comparison with our overall fund sample, the first funds reported in Table 1 include all the component first funds launched by hedge fund firms. So, there are more first funds reported in Table 1 than there are firms. We note that there are 6,882 firms in our sample. When the component funds are grouped together to form composite funds so that each firm is linked to only one first fund, we find that there are 4,618 firms with only one fund, 1,921 firms with two to five funds, 232 firms with six to ten funds, 85 firms with 11 to 20 funds, and 26 firms with more than 20 funds. We note that the time between successive fund launches is a decreasing function of the number of funds already launched by the firm. For example, after conceiving its first fund, a firm takes about 38 months on average to launch the second fund, another 28 months to launch the third fund, and another 22 months to launch the fourth fund.

[Insert Table 1 here]

Hedge fund data are susceptible to many biases (Liang, 2000; Fung and Hsieh, 2009). These biases stem from the fact that inclusion in hedge fund databases is voluntary. As a result, there is a self-selection bias. For instance, funds often undergo an incubation period in which they rely on internal funding before seeking capital from outside investors. Incubated

for the possibility that firms may launch more than one fund in their first month in two alternative ways. First, we drop firms that have more than one first fund, i.e., firms that launched more than one fund during their first month. Second, for such firms, we consider the largest fund launched during the first month as the first fund (based on fund AUM for the launch month) and remove the other smaller fund or funds conceived during that month. Our baseline results remain qualitatively unchanged with these adjustments.

funds with successful track records then go on to list in various hedge fund databases while the unsuccessful funds do not, resulting in an incubation bias. Related to this, when a fund is listed on a database, it often includes data prior to the listing date. Again, because successful funds have a strong incentive to list and attract capital inflows, these backfilled returns tend to be higher than the non-backfilled returns. In the analysis that follows, we will repeat the tests after dropping the first 24 months of return data from each fund to ensure that the results are robust to backfill and incubation bias. To fully address concerns about backfill bias raised by Bhardwaj, Gorton, and Rouwenhorst (2014) and others, we also redo the tests after removing all return observations that have been backfilled prior to fund listing date.

Throughout this paper, we model the risks of hedge funds using the Fung and Hsieh (2004) seven-factor model. The Fung and Hsieh factors are the excess return on the Standard and Poor's (S&P) 500 index (SNPMRF); a small minus big factor (SCMLC) constructed as the difference between the Wilshire small and large capitalization stock indices; the yield spread of the US ten-year Treasury bond over the three-month Treasury bill, adjusted for duration of the ten-year bond (BD10RET); the change in the credit spread of Moody's BAA bond over the ten-year Treasury bond, also appropriately adjusted for duration (BAAMTSY); and the excess returns on portfolios of look back straddle options on currencies (PTFSFX), commodities (PTFSCOM), and bonds (PTFSBD), which are constructed to replicate the maximum possible return from trend following strategies (see Fung and Hsieh, 2001) on their respective underlying assets.[13] These seven factors have been shown by Fung and Hsieh (2004) to have considerable explanatory power on hedge fund returns.

[13]The trend following factors can be downloaded from http://faculty.fuqua.duke.edu/ dah7/DataLibrary/TF-Fac.xls.

3. Empirical results

3.1 Spillover effects within hedge fund firms

Our first set of tests focuses on spillover effects within hedge fund firms. We ask, how does stellar first fund performance benefit the follow-on funds managed by the same firm? We explore these spillover effects by testing the relationship between the past performance of the first fund and the fund attributes of as well as flows into follow-on funds. Specifically, we estimate the following OLS regressions:

$$FUNDATTRIBUTE_i = a + bFIRSTALPHA_i + cNFIRSTALPHA_i + \sum_k d^k STYLEDUM_i^k + \sum_y e^y YEARDUM_i^y + \epsilon_i, \quad (1)$$

$$FUNDFLOW_{im} = a + bFIRSTALPHA_{im-12,m-1} + cNFIRSTALPHA_{im-12,m-1} + dFUNDALPHA_{im-12,m-1} + \sum_k e^k STYLEDUM_i^k + \sum_y f^y YEARDUM_m^y + \epsilon_{im}, \quad (2)$$

where in Eq. (1), $FIRSTALPHA_i$ and $NFIRSTALPHA_i$ are the first and other follow-on fund monthly alpha averaged over the last 12 months prior to the launch of fund i, respectively, $FUNDATTRIBUTE_i$ is either follow-on fund management fee, performance fee, redemption period, or notice period, $STYLEDUM_i^k$ is follow-on fund style dummy for style k, and $YEARDUM_i^y$ is follow-on fund inception year dummy for year y. Fund alpha is fund monthly abnormal return after stripping away co-variation with the Fung and Hsieh (2004) seven factors. Alpha is estimated for all funds with at least 24 months of return information.[14] We assume that the fund attributes reported in the commercial databases are determined at

[14]The results remain qualitatively unchanged when alpha is estimated for all funds with at least 36 months of return data.

fund launch. In Eq. (2), $FIRSTALPHA_{im-12,m-1}$ and $NFIRSTALPHA_{im-12,m-1}$ are the first and other follow-on fund monthly alpha averaged over the last 12 months, respectively, $FUNDALPHA_{im-12,m-1}$ is own fund monthly alpha averaged over the last 12 months, and $FUNDFLOW_{im}$ is own fund monthly net inflow. We also estimate variants of the Eq. (1) and (2) regressions where the independent variables are monthly alphas averaged over the last 24 or 36 months.[15] Statistical inferences are based on White (1980) heteroskedasticity-consistent standard errors clustered at the fund level.

The results reported in Panels A to C of Table 2 indicate that stellar first fund performance confers a variety of benefits to the follow-on funds managed by the same firm. The coefficient estimates on $FIRSTALPHA$ in the fund attribute regressions suggest that controlling for the performance of the other funds within the same firm, firms with stellar first funds are able to raise follow-on funds that charge higher performance fees as well as set longer redemption and notification periods. The impact of past first fund performance on follow-on fund performance fee and on notice period is statistically significant at the one or five percent level regardless of whether we average first fund alpha over the 12-, 24-, or 36-month period prior to the launch of the follow-on fund. That on follow-on fund redemption period is statistically significant at the one percent level when we average first fund alpha over the 24- or 36-month period prior to follow-on fund launch. The results are economically meaningful. For example, the coefficient estimate on the first fund alpha in the notice period regression with monthly alpha averaged over the last 24 months indicates that a one standard deviation (or 1.44 percentage point) improvement in monthly alpha increases the notice period by 2.59 business days. This represents a 12.95% increase relative to a baseline notice period of a month, i.e., 20 business days.

[Insert Table 2 here]

Excellent first fund performance also allows hedge fund firms to raise more capital for their follow-on funds. The coefficient estimates on $FIRSTALPHA$ in the fund flow regressions

[15] Inferences do not change when we estimate regressions on raw fund returns instead of alphas.

indicate that controlling for own fund past alpha and the past performance of other follow-on funds within the same family, flows into follow-on funds are positively associated with the past performance of the first fund within the same family. The impact of first fund performance on follow-on fund flow is positive and statistically significant at the one or five percent level for alpha averaged over the past 12, 24, and 36 months. Specifically, a one standard deviation (or 1.44 percentage point) improvement in monthly alpha over the past 24 months is associated with a 0.29% increase in inflows into follow-on funds the next month. We note that the impact of first fund performance on follow-on fund flow is about 22.35% as large as the impact of own follow-on fund performance on follow-on fund flow, at least based on performance averaged over the past 24 months. Collectively, these results indicate that hedge fund firms are incentivized to deliver stellar performance with their first funds so as to raise follow-on funds on favorable terms.

3.2 Tests of hedge fund performance

To test whether the incentives to generate superior performance with first funds impact performance, we evaluate the performance of first funds relative to the performance of follow-on funds. Every month, we sort funds within each hedge fund firm into 20 portfolios based on fund inception date. The n^{th} portfolio corresponds to the n^{th} fund launched by the firm. The first portfolio is simply the first fund portfolio. The other portfolios are the follow-on fund portfolios sorted by launch date within the firm. Next, we average the returns of each fund inception portfolio across hedge fund firms and evaluate the performance of the 1^{st} fund (portfolio A), the 2^{nd} to 5^{th} funds launched (portfolio B), the 6^{th} to 10^{th} funds launched (portfolio C), and the 11^{th} to 20^{th} funds launched (portfolio D) relative to the Fung and Hsieh (2004) seven-factor model. Portfolio B is simply the average of the 2^{nd} to 5^{th} fund inception portfolios. The other follow-on fund portfolios are defined analogously. Since there are relatively few firms that launch ten or more funds, the average number of funds in these portfolios decreases as we go from portfolio A to portfolio D. On average,

portfolio A comprises 2,238 funds, portfolio B covers 348 funds, portfolio C encompasses 67 funds, and portfolio D contains 18 funds. Statistical inferences are based on White (1980) heteroskedasticity-consistent standard errors.

The results from the fund inception date sort, reported in Panel A of Table 3, indicate that first funds outperform follow-on funds. Portfolio A delivers an average return of 5.28% per annum after adjusting for co-variation with the Fung and Hsieh (2004) factors, while portfolio B delivers an average risk-adjusted return of 3.49%. The risk-adjusted spread between these two portfolios is statistically significant at the one percent level (t-statistic = 5.68) but economically modest at 1.79% per annum after adjusting for risk. The abnormal spread rises to a more impressive 3.45% per annum when we move from portfolio B to portfolio D. These results suggest that the later funds launched by a hedge fund firm tend to underperform the earlier funds launched by the same firm.

Since small hedge funds may not be relevant to large institutional investors, we also conduct the portfolio sort on the sample of hedge funds with at least US$20m of AUM. The results reported in Panel B of Table 3 indicate that our findings are not driven by the smallest funds in the sample. Given capacity constraints at the fund level, the annualized alphas of the portfolios shrink by on average 1.83% when we exclude the smaller funds from the analysis. Nonetheless, the spread between portfolios A and D remains economically and statistically significant at 4.07% per annum (t-statistic = 4.46).

[Insert Table 3 and Figure 1 here]

Figure 1 complements the results from Panel A of Table 3. It illustrates the monthly cumulative abnormal returns (henceforth CARs) from the portfolio of first funds (portfolio A) and the portfolios of follow-on funds (portfolios B, C, and D). CAR is the cumulative difference between a portfolio's excess return and its factor loadings (estimated over the entire sample period) multiplied by the Fung and Hsieh (2004) risk factors. The CARs in Figure 1 indicate that portfolio A consistently outperforms portfolios B, C, and D over the entire sample period.

There are concerns that first funds may outperform follow-on funds because the former funds manage fewer assets and therefore are less affected by capacity constraints (Berk and Green, 2004). To allay such concerns, we estimate the following pooled OLS regression:

$$\begin{aligned} ALPHA_{im} = a + bFIRST_i + c\log(SIZE_{im-1}) + dMGTFEE_i + ePERFFEE_i \\ + fNOTICE_i + gAGE_{im} + \sum_k h^k STYLEDUM_i^k \\ + \sum_y l^y YEARDUM_m^y + \epsilon_{im}, \end{aligned} \tag{3}$$

where $ALPHA$ is fund monthly abnormal return after stripping away co-variation with the Fung and Hsieh (2004) seven factors, $FIRST$ is an indicator variable that takes a value of one when a fund is a first fund and a value of zero otherwise, $SIZE$ is fund monthly AUM in millions of US$, $MGTFEE$ is fund management fee in percentage, $PERFFEE$ is fund performance fee in percentage, $NOTICE$ is fund redemption notification period in months, AGE is fund age in decades, $STYLEDUM$ is fund style dummy, and $YEARDUM$ is year dummy. The primary variable of interest is $FIRST$. The coefficient estimate on it provides an indication of the spread in risk-adjusted performance between first and follow-on funds. To facilitate the estimation of fund alpha, we only include results for funds with at least 24 months of return data. We also estimate the analogous regression on raw monthly fund returns to ensure that our findings are not artifacts of the risk adjustment methodology. Statistical inferences are based on White (1980) heteroskedasticity-consistent standard errors clustered at the fund level.

[Insert Table 4 here]

The results from the cross-sectional regression analysis are reported in columns one and two of Table 4. They corroborate the findings of the portfolio sorts and indicate that first funds outperform follow-on funds. Specifically, the coefficient estimate on $FIRST$ in the alpha regression reported in column two of Table 4 reveals that, controlling for other factors

that could explain fund performance, first funds outperform follow-on funds by 1.88% per annum after adjusting for risk. The coefficient estimates on the other control variables accord with the extant literature. High-powered incentives or fees (Agarwal, Daniel and Naik, 2009) and longer redemption notice periods (Aragon, 2007) are associated with superior performance while fund age is linked to poorer performance (Aggarwal and Jorion, 2010). Inferences do not change when we estimate the regression on raw returns suggesting that our findings are not driven by our risk adjustment technology.

To check for robustness, we estimate Fama and MacBeth (1973) regressions in place of the OLS regressions. Specifically, first we run cross-sectional regressions for each month. Then, we report the time-series averages of the coefficient estimates, and use the time-series standard errors of the average slopes to draw inferences. The Fama and MacBeth regressions control for correlation in residuals across different funds within the same month. We compute the standard errors using the method of Newey and West (1987) with a three-month lag to adjust for dependence across time. The Fama and MacBeth (1973) results reported in columns three and four of Table 4 echo our previous findings and indicate that they are robust to alternative model specifications.

The portfolio sorts in Table 3 not only suggest that first funds outperform follow-on funds but also allude to the more general finding that the earlier funds launched tend to outperform the later funds launched by the same firm. To test the impact of fund chronology in a regression setting, we re-estimate the Eq. (3) regressions with $CHRONO$ in place of $FIRST$, where $CHRONO$ is fund launch order within the firm. The results reported in columns five to eight of Table 4 indicate that controlling for the other factors that influence fund performance, funds that are launched earlier outperform funds that are launched later within each firm. The results are economically and statistically significant. The OLS coefficient estimate on $CHRONO$ in column six of Table 4 reveals that a one standard deviation increase in fund launch order, i.e., by 6.90 funds, is associated with a 1.16 percent per

annum reduction in fund alpha.[16]

To test whether the underperformance of follow-on funds is driven by agency problems at hedge funds, we compare the performance differential between first and follow-on funds for groups of hedge funds sorted by incentive alignment. One way to align incentives is for the manager to co-invest personal capital alongside her limited partners. Hence, we sort funds into those with personal capital and those without personal capital. This is only possible for TASS funds since only TASS provides information on personal capital. Next, we re-estimate the Eq. (3) regressions for these two groups of hedge funds. The results reported in Table A1 of the Internet Appendix indicate that consistent with the agency view, the outperformance of first funds is largely driven by funds with poor incentive alignment, i.e., those with no personal capital.[17]

3.3 Tests of hedge fund firm performance

Do investors benefit when hedge fund firms deliver superior performance with their first funds and subsequently raise capital via follow-on funds? It is not clear whether the superior performance of the first fund more than compensates for the inferior performance of the follow-on funds launched by a hedge fund firm. To investigate, every month, we sort firms into five portfolios based on the number of funds previously launched. The first portfolio consists of firms that have launched only one fund. The other firms are sorted equally into the other four portfolios. The post-formation returns on these five portfolios during the next month are linked across months to form a single return series for each portfolio. We then

[16]We also estimate the same set of regressions as in Table 4 but with both $FIRST$ and $CHRONO$ as independent variables, together with the same set of controls. The results are largely robust to the inclusion of both independent variables in the regression. The coefficient estimates on $FIRST$ are positive and statistically significant at the one percent level across all regressions specifications. Those on $CHRONO$ are all negative and statistically significant at the one percent level, save for that in the Fama-MacBeth regression on fund returns, which it is negative and statistically significant at the ten percent level. These results are available upon request and suggest that successive fund performance continues to deteriorate even after the launch of the first follow-on fund.

[17]The Fama-MacBeth regressions for the subsets of funds with and without personal capital reported in Table A1 do not feature strategy fixed effects as, within each group, there exist months where there are no funds in some strategies.

evaluate the performance of the portfolios relative to the Fung and Hsieh (2004) model. The alpha of the spread between portfolio 1 (firms with one fund) and portfolio 5 (firms with many funds) represents the dispersion in risk-adjusted returns across firms as a result of the variation in number of funds per firm launched. To calculate hedge fund firm returns, we weight all the funds with return observations within each firm by fund AUM.

The results from the hedge fund firm sort are reported in Panel A of Table 5. They indicate that the practice of generating superior first fund performance and raising capital via follow-on funds does not benefit fund investors. Firms managing many funds underperform firms managing one fund by 3.74% per annum. After adjusting for co-variation with the Fung and Hsieh (2004) factors, this spread rises marginally to 3.77% per annum. Both the raw return and risk-adjusted return spreads are statistically significant at the one percent level. In addition, the excess returns decrease monotonically as we move from portfolio 1 to portfolio 5. In Panel B of Table 5, we report the results when we equal-weight fund returns to obtain firm returns. They indicate that our findings are robust to varying the way we compute firm returns.[18]

The results in Panels A and B of Table 5 are consistent with the asset gathering view where hedge fund firms with successful first funds take advantage of their stellar track records and raise follow-on funds that subsequently underperform. The asset gathering view further predicts that in order to grow capital aggressively, firms will offer funds in multiple divergent investment strategies to cater to an investor preference for diversification (Massa, 2003). To test this view, every month, we sort firms into five portfolios based on the average pairwise correlation of the strategies of the funds managed by the firm. To maximize the precision of the correlation estimate, pairwise strategy correlation is estimated over the entire sample period for each strategy pair. The first portfolio consists of firms that have launched only funds in one strategy. The other firms are sorted equally into the other four portfolios.

[18]Inferences do not change when we adjust for backfill and incubation bias by removing the first 24 months of returns for each fund or when we adjust for backfill bias by confining the sample to hedge fund returns reported at or after fund listing date.

The post-formation returns on these five portfolios during the next month are linked across months to form a single return series for each portfolio. We then evaluate the performance of the portfolios relative to the Fung and Hsieh (2004) model. The alpha of the spread between portfolio I (firms with one strategy) and portfolio V (firms with uncorrelated strategies) represents the dispersion in risk-adjusted returns across firms as a result of the variation in intra-firm strategy correlation. The advantage of sorting on strategy divergence as opposed to the number of strategies within each firm is that we avoid commingling firms that engage in multiple but similar investment strategies with firms that pursue multiple and divergent investment strategies. The latter is more consonant with a growth-oriented asset gathering strategy that caters to an investor preference for diversification.

The results reported in Panels C and D of Table 5 indicate that firms managing divergent strategies underperform firms managing correlated strategies. When we value-weight fund returns to obtain firm returns, the underperformance is 4.21% per annum. After adjusting for co-variation with the Fung and Hsieh (2004) factors, this spread falls marginally to 3.70% per annum. Both the raw and risk-adjusted return spreads are statistically significant at the one percent level. Inferences do not change when we equal-weight fund returns to obtain firm returns.

[Insert Tables 5 and 6 here]

To address concerns that the firm sort results may be driven by other factors that drive fund performance, we estimate the Eq. (3) OLS and Fama-MacBeth regressions with the independent variables *NFUNDS* or *STRATCORR* in addition to *FIRST*.[19] The variable *NFUNDS* is the number of funds launched by the hedge fund firm while *STRATCORR* is the average pairwise correlation of the strategies engaged by the firm. The multivariate regression results reported in Table 6 corroborate the findings from the portfolio sorts in Table 5. The coefficient estimates on *NFUNDS* are negative and statistically significant at the one or five percent level for all regression specifications, while those on *STRATCORR* are positive

[19]Inferences do not change when we exclude *FIRST* as an independent variable in these regressions.

and statistically significant at the one percent level across all regression specifications. These findings dovetail with the asset gathering view.

3.4 Tests of hedge fund firm revenue

How does raising multiple funds affect the total fee revenue that accrues to the firm management company? To investigate, we sort firms into five portfolios based on the number of funds launched as in Panel A of Table 5. Next, we evaluate the total firm fee revenue (management fee plus performance fee) over the subsequent one-year period. Fund performance fee is calculated based on the assumptions outlined in Appendix A of Agarwal, Daniel, and Naik (2009) and after accounting for the high water mark feature in hedge fund incentive fee contracts.

We find that hedge fund management companies benefit significantly from launching multiple funds or products. On average, the multiple-product firms in portfolio 5 (firms with many funds) harvest an annual fee revenue of US$25.50 million, which is US$21.68 million greater than that harvested by the average single-product firm in portfolio 1 (firms with one fund). The difference in fee revenues is statistically significant at the one percent level. The greater AUM of the multiple-product firms drives much of the fee revenue difference. On average, firms in portfolio 5 manage US$866.44 million, while firms in portfolio 1 manage only US$95.37 million.[20]

These results suggest that hedge fund firms (not investors) benefit from the multiple-product growth strategy. Unsurprisingly, we find that this has become the dominant business model for hedge fund firms. At the start of our sample period, multiple-product firms manage 47.14% of funds (by number) and 62.56% of industry assets. By the end of the sample period, multiple-product firms manage 68.94% of funds (by number) and 77.19% of industry assets.

[20]We obtain similar inferences when we sort based on the average pairwise correlation of the strategies of the funds managed by the firm. Multiple-product firms in portfolio V (firms with uncorrelated strategies) harvest average annual fee revenues of US$14.11 million, which is US$8.54 million greater than that harvested by the average single-product firm in portfolio I (firms with correlated strategies). The difference in fee revenues is statistically significant at the one percent level. Firms in portfolio V manage US$467.96 million while firms in portfolio I manage US$143.36 million.

3.5 Event study

Do firms protect the performance of their first funds while simultaneously operating other follow-on funds? To investigate, we first plot the monthly abnormal returns of the average first fund 36 months before to 36 months after the launch of the first follow-on fund by the same firm. To accommodate the 36-month window, the fund sample we analyze only includes first funds whose firms raised a subsequent fund between January 1997 and December 2010, and that report returns in the 24-month period before and in the 24-month period after the launch of the follow-on fund.

The resultant graph in Figure 2 suggests that first fund performance deteriorates once the firm launches a subsequent fund. The average annual first fund risk-adjusted return prior to the follow-on fund launch is 10.83%, while the analogous return after the follow-on fund launch is 5.48%. This implies that first fund performance deteriorates by 5.35% once the firm launches another fund. In Figure 2, we also plot the AUM of the average first fund over the same event window. We find that despite the deterioration in first fund performance, the average first fund is able to increase its AUM by 51% from US$193m to US$292m in the 36-month period after the launch of the first follow-on fund by the same firm. This represents a substantial increase in AUM on the back of a 72% growth in AUM from US$112m to US$193m over the 36-month period prior to the launch. The first fund returns and AUM depicted in Figure 2 suggest that following a bout of stellar performance at their first funds, hedge fund firms aggressively raise capital by launching new funds and marketing the first funds to investors. The resultant increase in AUM at the first funds may explain, at least in part, their subsequent underperformance.

[Insert Figure 2 and Table 7 here]

To account for endogeneity concerns driven by observable differences between firms that launch follow-on funds and firms that do not, we match event hedge funds with non-event hedge funds based on fund performance and AUM in the 24-month pre-launch period and

conduct a difference-in-differences analysis. For example, in the fund abnormal return or alpha analysis, event funds are matched to non-event funds by minimizing the sum of the absolute differences in monthly fund abnormal return in the 24-month pre-launch period. Table 7 reports differences in fund return, alpha, and AUM before and after the launch of the first follow-on fund relative to the matched sample. The results reported in Table 7 indicate that relative to the matched sample, first fund annualized return and alpha fall by 1.92% after the launch of the first follow-on fund. At the same time, relative to comparable funds, first fund AUM (averaged over 36 months) increases by US$26.21m in post-event period relative to that in the pre-event period.

To test whether the outperformance of first funds is confined to the period prior to the launch of the first follow-on fund, we estimate OLS regressions on monthly fund alpha analogous to that in Eq. (3) but with $FIRST\_PRELAUNCH$ as an additional independent variable. The indicator variable $FIRST\_PRELAUNCH$ takes a value of one if the fund is the first fund managed by a firm and the firm will but has yet to launch another fund, and a value of zero, otherwise. In results that are available upon request, we find that the outperformance of the first fund is not confined to the period prior to the launch of the subsequent fund by the same firm. The coefficient estimate on $FIRST\_PRELAUNCH$ is positive and statistically significant at the one percent level. It suggests that after adjusting for other factors that explain fund performance, first fund abnormal returns decrease by 1.86% per year after the launch of follow-on funds.[21] The coefficient estimate on $FIRST$ is also positive and statistically significant at the one percent level. It indicates that first funds continue to outperform follow-on funds by 1.25% per year on a risk-adjusted basis even after the launch of the first follow-on fund by the same firm.

[21] We believe there are two possible explanations for the drop in first fund performance. First, partners at firms that launch follow-on funds may be busy managing those follow-on funds and cannot devote as much of their time to driving the investment process at the first fund. Second, firm partners may be less incentivized to deliver superior performance with the first fund now that they have raised enough capital to achieve critical mass at the firm level.

3.6 Intra-firm performance spillovers

Are firms with first funds that delivered stellar performance skilled or simply lucky? One view is that these firms are simply growing capital opportunistically in the wake of a lucky run at the first fund. However, that view necessarily calls into question the rationality of hedge fund investors who subscribe to the first and follow-on funds launched by such firms.

To investigate, we test the relationship between first fund performance prior to the launch of the first follow-on fund and the performance of the follow-on fund post inception. Specifically, we estimate the following regression on follow-on fund performance:

$$\begin{aligned} NFIRSTALPHA_{im,m+11} = a + bFIRSTALPHA_{im-12,m-1} + c\log(NFIRSTSIZE_{im}) \\ + dNFIRSTMGTFEE_i + eNFIRSTPERFFEE_i \\ + fNFIRSTNOTICE_i + \sum_k g^k NFIRSTSTYLEDUM_i^k \\ + \sum_y h^y YEARDUM_m^y + \epsilon_{im}, \end{aligned} \tag{4}$$

where m is the follow-on fund inception month, $NFIRSTALPHA_{im,m+11}$ is follow-on fund abnormal return averaged over the 12-month post-inception period, $FIRSTALPHA_{im-12,m-1}$ is first fund abnormal return averaged over the 12-month pre-inception period, $NFIRSTSIZE_{im}$ is follow-on fund size in US$m at fund inception, $NFIRSTMGTFEE_i$ is follow-on fund management fee in percentage, $NFIRSTPERFFEE_i$ is follow-on fund performance fee in percentage, $NFIRSTNOTICE_i$ is follow-on fund redemption notification period in months, $NFIRSTSTYLEDUM_i^k$ is follow-on fund style dummy for style k, and $YEARDUM_m^y$ is follow-on fund inception year dummy for year y. We estimate the univariate version of the regression as well as two other versions where fund abnormal returns are averaged over 24 and 36 months instead of over 12 months. Statistical inferences are based on White (1980) heteroskedasticity-consistent standard errors clustered at the firm level.

The coefficient estimates reported in columns one to six of Table 8 suggest that fund risk-adjusted performance persists within hedge fund firms. A one percentage point increase in first fund monthly alpha in the 12-month period prior to the launch of the first follow-on fund is associated with a 13.6 basis point increase in follow-on fund monthly alpha in the 12-month post launch period that is statistically significant at the one percent level. After controlling for other variables that can explain follow-on fund performance, the coefficient estimate on first fund alpha decreases by about a third but is still statistically significant at the one percent level. We obtain similar results when investigating alpha or abnormal returns averaged over 24 months. When abnormal returns are averaged over 36 months, the coefficient estimates on $FIRSTALPHA$ are significantly weaker and not always statistically distinguishable from zero at the five percent level.

[Insert Table 8 here]

To investigate persistence in first fund performance, we estimate the following regression:

$$\begin{aligned} FIRSTALPHA_{im,m+11} = a &+ bFIRSTALPHA_{im-12,m-1} + c\log(FIRSTSIZE_{im-1}) \\ &+ dFIRSTMGTFEE_i + eFIRSTPERFFEE_i \\ &+ fFIRSTNOTICE_i + \sum_k g^k FIRSTSTYLEDUM_i^k \\ &+ \sum_y h^y YEARDUM_m^y + \epsilon_{im}, \end{aligned} \tag{5}$$

where m is the follow-on fund inception month, $FIRSTALPHA_{im,m+11}$ is first fund abnormal return averaged over the 12-month post-inception period, $FIRSTALPHA_{im-12,m-1}$ is first fund abnormal return averaged over the 12-month pre-inception period, $FIRSTSIZE_{im-1}$ is first fund size in US$m, $FIRSTMGTFEE_i$ is first fund management fee in percentage, $FIRSTPERFFEE_i$ is first fund performance fee in percentage, $FIRSTNOTICE_i$ is first fund redemption notification period in months, $FIRSTSTYLEDUM_i^k$ is first fund style dummy for style k, and $YEARDUM_m^y$ is follow-on

fund inception year dummy for year y. We estimate the univariate version of the regression as well as two other versions where fund abnormal returns are averaged over 24 and 36 months instead of over 12 months.

The coefficient estimates reported in columns seven to 12 of Table 8 indicate that first fund performance persists around the launch of the first follow-on fund. A one percentage point increase in first fund monthly alpha in the 12-month period prior to follow-on fund launch is associated with a 12.6 basis point increase in first fund monthly alpha in the 12-month period post follow-on fund launch. The coefficient estimate is statistically significant at the one percent level, and prevails after controlling for the other factors that explain first fund performance. In addition, the findings are robust to extending the evaluation horizon to 24 or 36 months. Therefore, firms with stellar first fund performance are not simply lucky. Investors who subscribe to the first and follow-on funds managed by such firms are rationally responding to the view that they employ talented investment professionals.

3.7 Blowback effect

Are there constraints on the amount of capital that hedge fund firms can raise when adopting a multiple-product growth strategy? We test for evidence of a feedback or blowback effect from follow-on funds to first funds by estimating the following regression on first fund flow:

$$FIRSTFLOW_{im} = a + bFIRSTALPHA_{im-12,m-1} + cNFIRSTALPHA_{im-12,m-1} + \sum_k d^k FIRSTSTYLEDUM_i^k + \sum_y e^y YEARDUM_m^y + \epsilon_{im}, \quad (6)$$

where $FIRSTFLOW_{im}$ is flow into first fund i on month m, $FIRSTALPHA_{im-12,m-1}$ is first fund i abnormal return averaged over the 12-month period prior to month m, $NFIRSTALPHA_{im-12,m-1}$ is follow-on fund abnormal return averaged over the 12-month period prior to month m and averaged over all follow-on funds managed by the firm that launched fund i, $FIRSTSTYLEDUM_i^k$ is first fund i style dummy for style k, and

$YEARDUM_m^y$ is year dummy for year y. Statistical inferences are based on White (1980) heteroskedasticity-consistent standard errors clustered at the firm level.

The results reported in Table 9 indicate that there is a significant blowback effect from follow-on funds to first funds. Poor follow-on past performance is a reliable harbinger of lower flows into first funds. The impact of follow-on fund alpha is statistically significant at the one percent level when returns are averaged over the last 12 or 24 months, even after controlling for own fund past alpha. Moreover, the impact of follow-on fund alpha is economically significant. Panel A of Table 9 indicates that for alpha evaluated over the last 12 months, it is about 17.54% as large as the impact of first fund alpha on first fund flow. These results suggest that investors rationally impose constraints on the ability of hedge fund firms to grow via the launch of multiple products. Firms that embark on this strategy will need to balance quantity with quality when launching new funds.

[Insert Table 9 here]

3.8 Hedge fund investor preferences

Do investors understand the incentive differences that hedge fund firms face when it comes to first versus follow-on funds? To explore this question, it is helpful to have access to information on investor holdings. However, information on investor holdings of hedge funds is rarely available in practice.[22] To circumvent the data availability issue, we exploit return data on fund of hedge funds (henceforth FoFs).

First, we sort our sample of FoF managers into deciles based on past two-year alpha t-statistics.[23] The post-formation returns on these ten portfolios over the next 12 months are linked across years to form a single return series for each portfolio. We then evaluate

[22] An exception is Aiken, Clifford, and Ellis (2015) who examine the hedge fund holdings of registered FoFs. However, they are only able to examine 79 FoFs due to the small number of registered FoFs.

[23] We sort based on t-statistic of fund alpha as opposed to fund alpha as Kosowski, Naik, and Teo (2004) show using bootstrap estimates that the performance of top hedge funds ranked by t-statistic of fund alpha (which is similar to sorting by the information ratio often used to rank fund managers) cannot be attributed to sample variation or luck.

the performance of the portfolios relative to the Fung and Hsieh (2004) model. We find that FoFs with high past alpha t-statistics subsequently outperform FoFs with low past alpha t-statistics. Specifically, the alpha of the spread between the top and bottom deciles of FoFs sorted on past two-year alpha t-statistics is 6.31% per annum (t-statistic = 4.79).

Next, we construct two portfolios of hedge funds based on fund launch order. Portfolio 1 comprises the first funds launched by each hedge fund firm while portfolio 2 comprises the follow-on funds launched by each hedge fund firm. We find that after controlling for co-variation with the Fung and Hsieh (2004) seven factors, the loading on $HFCHRONO$ or the return spread between first and follow-on hedge fund portfolios for the FoF decile spread is 0.56 (t-statistic = 2.08). This implies that skilled FoFs, i.e., those with high past alpha t-statistics, tend to load up more on first funds versus follow-on funds than do unskilled FoFs, i.e., those with low past alpha t-statistics. Moreover, the first versus follow-on hedge fund spread explains 1.09% of the 6.31% per annum spread between the top and bottom deciles of FoFs sorted on past two-year alpha t-statistics. These results, which are reported in Table A2 of the Internet Appendix, suggest that relative to their unskilled competitors, skilled investors may be cognizant of the impact of fund chronology on fund performance, and judiciously overweight the first funds launched by hedge fund firms.

3.9 Endogeneity

Does the endogeneity of a firm's growth strategy engender the underperformance of follow-on versus first funds? Systematic differences may exist between firms that conceive follow-on funds (multiple-product firms) and those that do not (single-product firms). These differences could impact both the propensity to launch follow-on funds and the performance spread between first and follow-on funds. The multivariate regression methodology that we employ in Section 3.2 allows us to ameliorate concerns that observed differences between funds managed by single- and multiple-product firms explain our results.

Still, the multivariate regressions leave open the possibility that unobserved differences

between funds managed by single- and multiple-product firms might simultaneously affect the decision to embark on a multiple-product growth strategy and the first versus follow-on fund performance spread. To address this concern, we conduct an instrumental variables analysis. The instrument that we use, i.e., firm strategy flow at founding, is motivated by Asker, Farre-Mensa, and Ljungqvist's (2015) choice of venture capital supply at founding to instrument for firm listing status. Firm strategy flow at founding is the strategy flow of the first fund conceived by the firm in the one-year period prior to firm inception.[24] We argue that the ability to attract capital at inception allows a first fund to grow quickly and sets the stage for the launch of follow-on funds later (a firm takes about 38 months on average to launch the second fund, another 28 months to launch the third fund, etc). The first-stage results in column one of Table A3 in the Internet Appendix confirm this prediction. The supply of capital around the time of firm founding is a negative and significant predictor of a firm's single-product status, proxied by *FIRST*, with an F-statistic of 20.52.[25]

The exclusion restriction is that conditional on covariates, firm strategy flow in the one-year period before inception only affects fund investment performance through its impact on fund launch chronology status. One concern is that early firm strategy flow may drive future strategy returns via strategy-level capacity constraints (Naik, Ramadorai, and Strömqvist, 2007). In unreported results, we find that higher prior year strategy flow is not a reliable harbinger of lower future strategy returns. Therefore, our use of strategy flow as opposed to AUM allows us to sidestep concerns related to strategy-level capacity constraints.

In columns two and three of Table A3, we report the second stage results for the fund return and alpha equations, respectively. After instrumenting for first fund status or *FIRST* with firm strategy flow at inception, first funds continue to outperform follow-on funds. The

[24]Specifically, Asker, Farre-Mensa, and Ljungqvist (2015) use as their instrument the total number of firms receiving first-round venture capital funding in a firm's headquarter state two years after a firm was funded. We use firm strategy flow in the one-year period *before* firm inception as an instrument since we seek to explain fund launch chronology status for all periods post firm inception. We obtain similar inferences when we use firm strategy flow during the two-year period before inception.

[25]For single-fund firms, *FIRST* is always equal to one. For multiple-fund firms, the probability that *FIRST* equals to one in any month is a decreasing function of the number of follow-on funds launched by the firm that report returns that month.

results reported in columns four to six of Table A3 indicate that the more general fund launch chronology results are also robust to adjusting for endogeneity. The supply of capital around the time of firm founding is a positive and significant predictor of fund launch chronology or *CHRONO* with an F-statistic of 133.71. After instrumenting for fund launch chronology with firm strategy flow at inception, the later funds launched by firms still underperform the earlier funds launched by firms.

4. Robustness tests

In this section, we present a medley of robustness tests to ascertain the strength of our empirical results.

4.1 Backfill bias

First funds may backfill their returns more than do follow-on funds. In response to concerns about backfill bias raised by Bhardwaj, Gorton, and Rouwenhorst (2014) and others, we confine the analysis to TASS and HFR funds for which we have the date that the fund listed on the databases (only TASS and HFR provide this information). Next, we redo the baseline Table 3 portfolio sort for this subset of funds and for those returns at or after the respective fund listing date. As shown in Panel A of Table 10, our results are robust to controlling for backfill bias in this fashion. Inferences also remain unchanged when, as an alternative, we remove the first 24 months of returns for all funds to adjust for backfill and incubation bias.

[Insert Table 10 here]

4.2 Serial correlation

Serial correlation in fund returns could arise from linear interpolation of prices for infrequently traded securities, the use of smoothed broker dealer quotes, or deliberate performance-smoothing behavior. This could inflate some of the test statistics that we

use to make inferences. To allay such concerns, we unsmooth fund returns using the algorithm of Getmansky, Lo, and Makarov (2004) and redo the Table 3 portfolio sort. The results reported in Panel B of Table 10 indicate that our findings are not driven by serial correlation.

4.3 Pre-fee returns

Hedge fund returns are reported net of fees. If first funds charge lower fees than do follow-on funds, this may explain the outperformance of the former. To check, we back out pre-fee fund returns. As shown in Panel C of Table 10, the baseline portfolio sort spreads are even greater when we analyze pre-fee fund returns.

4.4 Dynamic risk exposures

One concern is that the beta loadings of the fund portfolios might not stay constant over time. As a result, the risk-adjustment for the baseline portfolio sort might not be accurate. To account for dynamic factor loadings, we calculate the factor loadings using a rolling 36-month window and use those factor loadings to calculate abnormal returns one month forward. The results, presented in Panel D of Table 10, indicate that our findings are robust to catering for dynamic risk exposures.

4.5 Additional risk factors

The presence of additional risk factors could cloud the portfolio sort analyses. Relative to follow-on funds, first funds could be loading up more on some risk factor (e.g., emerging markets) that did well over the sample period. Hence, we augment the Fung and Hsieh (2004) model with an emerging markets factor derived from the MSCI Emerging Markets Index return and redo the Table 3 portfolio sort. To cater for hedge fund exposure to option based strategies (Mitchell and Pulvino, 2001), we also augment the Fung and Hsieh (2004)

model with out-of-the-money (henceforth OTM) S&P 500 call and put option-based factors from the Agarwal and Naik (2004) model. Finally, to account for hedge fund exposure to liquidity risk (Aragon and Strahan, 2012; Sadka, 2012), we augment the Fung and Hsieh model with the Pástor and Stambaugh (2003) liquidity factor. The results presented in Panels E to G of Table 10 indicate that our baseline findings are not driven by the presence of omitted risk factors.[26]

4.6 Fund termination

There are concerns that because funds that drop out from the database could have terminated their operations, the portfolio alphas are biased upward. Edelman, Fung, and Hsieh (2013) find that returns of funds after they dropped out of the databases do not differ materially from returns of funds that remain in the databases. Nonetheless, to allay such concerns, we assume that, for the month after a fund drops out of the database, its return is –10%. Thereafter, money is reallocated to the remaining funds in the portfolio. As shown in Panel H of Table 10, with that adjustment for fund termination, the alphas of the portfolios in our Table 3 sorts fall but the spread remains economically and statistically significant. We also experiment with more extreme termination returns of –20% and –30%, and obtain qualitatively similar results.

4.7 Subsample analysis

To understand how the outperformance of first funds varies over time, we split the sample period into two sub-periods: January 1994 to December 2003 and January 2004 to December 2013. Next, we redo the Table 3 portfolio sort for each sub-period. The results in Panels I and J of Table 10 indicate that our findings are stronger in the first sub-period than in the second sub-period. Nonetheless, the alpha of the spread between portfolios A and D is still

[26]Inferences do not change when we augment the Fung and Hsieh model with the emerging markets factor, the OTM call and put option-based factors, and the Pástor and Stambaugh (2003) liquidity factor, and use the resultant 11-factor model to adjust for risk exposure in our portfolio sorts.

economically and statistically significant at 2.85% per annum (t-statistic = 2.28).

5. Conclusion

The empirical results in this paper enrich our understanding of capital accumulation in the hedge fund industry. We show that there exists spillover effects from first to follow-on funds launched by hedge fund firms. Stellar first fund performance allows hedge fund firms to raise follow-on funds that charge higher fees, set more onerous redemption terms, and attract more capital. The spillover effects in turn lead hedge fund firms to focus more on the performance of their first funds. Consequently, first funds outperform follow-on funds after adjusting for risk. In line with an agency explanation, the performance spread between first and follow-on funds is strongest for funds with poor incentive alignment, i.e., where the managers do not co-invest alongside their limited partners. Also consistent with the agency view, the strategy of leveraging on successful first fund performance to launch multiple follow-on funds hurts investors but benefits fund managers. Multiple-product firms underperform single-product firms while harvesting greater fee revenues. Investors respond to this growth strategy by redeeming from first funds when follow-on funds underperform. Therefore, firms cannot completely forsake quality when embarking on a multiple-product growth strategy that emphasizes quantity. Moreover, skilled hedge fund investors appear cognizant of the incentive differences that first versus follow-on funds face. They judiciously load more on the earlier funds launched than on the later funds launched by hedge fund firms. Ironically, while growing the hedge fund franchise by launching multiple products hurts performance ex-post, the prospect of generating substantial fee revenues through a multiple-product hedge fund firm may well incentivize outperformance ex-ante.

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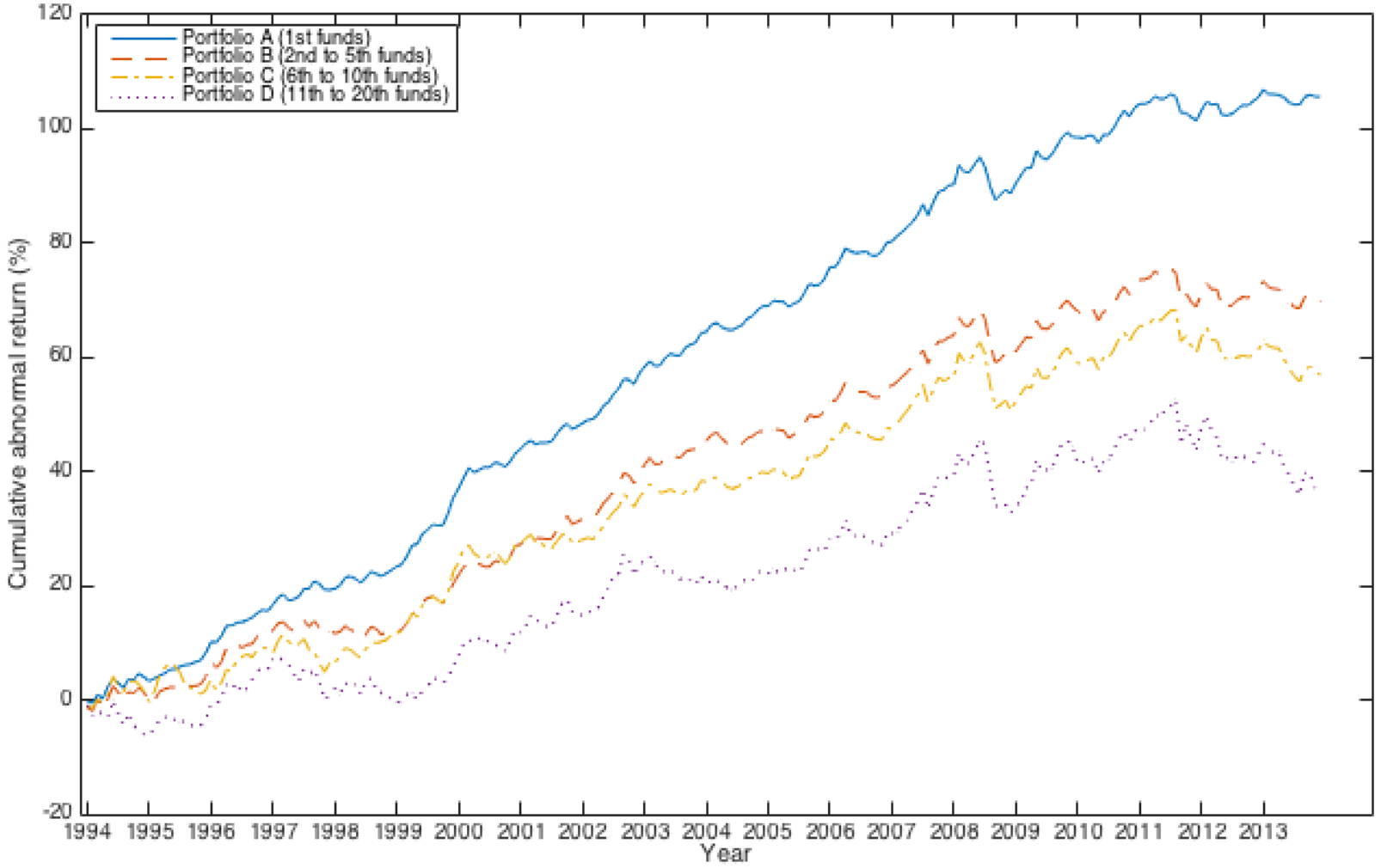

Fig 1: Cumulative abnormal return of funds sorted on fund inception date. Portfolios of hedge funds are constructed by sorting funds based on fund inception date. For each hedge fund firm, the first fund is the first fund launched by the firm. The first fund portfolio is the equal-weighted return of the first funds across firms. The other portfolios are defined analogously. Cumulative abnormal return is the difference between a portfolio's excess return and its factor loadings multiplied by risk factors from the Fung and Hsieh (2004) seven-factor model. Factor loadings are estimated over the entire sample period. The sample period is from January 1994 to December 2013.

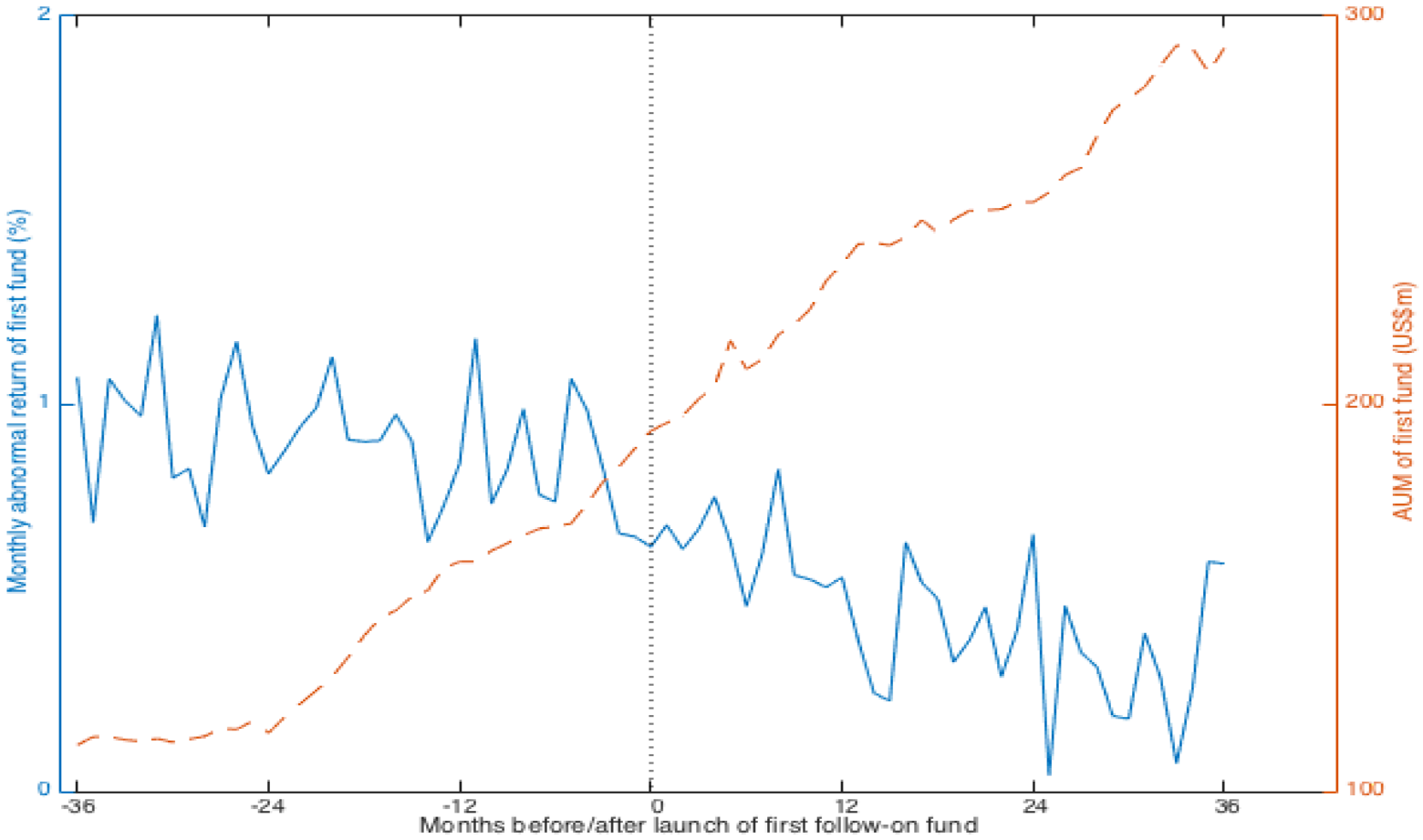

Fig 2: Average monthly abnormal return and assets under management of first funds before and after launch of the first follow-on fund by the same firm. Monthly abnormal return is the difference between a portfolio's excess return and its factor loadings multiplied by risk factors from the Fung and Hsieh (2004) seven-factor model. Factor loadings are estimated over the entire sample period. For each hedge fund firm, the first fund is the first fund launched by the firm. First fund abnormal returns and assets under management (AUM) are averaged across firms. The sample includes firms that launch at least one follow-on fund from January 1997 to December 2013. Month 0 denotes the inception month for the first follow-on fund managed by the same firm. The abnormal return graph is represented by the solid line (y-axis on the left) while the AUM graph is represented by the dashed line (y-axis on the right). The sample period is from January 1994 to December 2013.

Table 1

Summary statistics

The sample period is from January 1994 to December 2013. Funds are grouped according to their primary investment strategy. The list of strategies follows Joenväärä, Kosowski, and Tolonen (2017) and includes Commodity Trading Advisors, Emerging Markets, Event Driven, Global Macro, Long Only, Equity Long/Short, Market Neutral, Multi-Strategy, Relative Value, Sector, Short Bias, and Others.

				Follow-on funds			
Investment strategy	Total funds	Dead funds	1st funds	2nd-5th funds	6th-10th funds	11th-20th funds	Return months
Panel A: Full sample							
Commodity Trading Advisors	1,507	330	813	537	95	44	89,017
Emerging Markets	833	371	320	306	85	46	57,777
Event Driven	1,162	329	523	412	125	68	87,973
Global Macro	1,949	657	857	727	151	84	117,580
Long Only	222	149	62	72	20	18	17,510
Equity Long/Short	5,341	1,578	2,657	1,772	478	250	377,870
Market Neutral	440	96	184	160	46	35	27,780
Multi-Strategy	2,222	1,100	839	602	191	184	141,800
Relative Value	2,459	815	1,069	880	265	116	152,050
Sector	309	127	132	102	24	25	22,034
Short Bias	34	5	19	13	2	0	2,868
Others	350	76	191	124	27	8	18,277
Total	16,828	5,633	7,666	5,707	1,509	878	1,112,500
Panel B: Without duplicate share classes							
Commodity Trading Advisors	1,455	315	804	516	89	32	85,971
Emerging Markets	717	306	311	272	63	37	52,458
Event Driven	1,053	301	497	364	105	54	80,807
Global Macro	1,850	638	841	663	146	74	112,830
Long Only	193	130	63	65	20	15	16,065
Equity Long/Short	4,922	1,498	2,576	1,555	423	208	357,240
Market Neutral	389	86	177	141	37	21	24,939
Multi-Strategy	2,139	1,077	833	554	174	178	137,370
Relative Value	2,268	744	1,043	799	221	98	142,980
Sector	276	107	128	89	23	22	19,967
Short Bias	31	4	18	12	1	0	2,626
Others	314	63	188	102	21	3	16,780
Total	15,607	5,269	7,479	5,132	1,323	742	1,050,000

Table 2
Regressions on follow-on fund attributes and flow

Regressions are estimated on the fees, redemption terms, and flows for follow-on funds managed by each hedge fund firm. For each firm, we distinguish between the first fund launched and other follow-on funds. In the fund attribute regressions, the independent variables include FIRSTALPHA and NFIRSTALPHA, where FIRSTALPHA is the alpha of the first fund within the same firm averaged over the last x months prior to the launch of the follow-on fund and NFIRSTALPHA is the alpha of the other follow-on funds within the same firm averaged over the last x months prior to the launch of the follow-on fund. In the fund flow regressions, the independent variables include FIRSTALPHA, NFIRSTALPHA, and FUNDALPHA, where FUNDALPHA is own fund alpha averaged over the last x months. Fund management fee and performance fee are in percentage, while fund redemption period and notice period are in business days. The regressions include controls for follow-on fund investment style and inception year fixed effects. The t-statistics, derived from robust standard errors that are clustered at the fund level, are in parentheses. In Panels A, B, and C, the lookback period x equals 12, 24, and 36 months, respectively. The sample period is from January 1994 to December 2013. * Significant at the 5% level; ** Significant at the 1% level.

	Dependent variables				
Independent variables	Follow-on fund management fee	Follow-on fund performance fee	Follow-on fund redemption period	Follow-on fund notice period	Follow-on fund monthly flow
Panel A: Regressions with alphas averaged over the last 12 months					
FIRSTALPHA	0.007	0.257**	0.618	1.121**	0.148*
	(0.72)	(2.84)	(1.65)	(2.92)	(2.16)
NFIRSTALPHA	0.021*	0.342**	0.722	0.987	0.223*
	(2.10)	(3.27)	(1.18)	(1.86)	(1.99)
FUNDALPHA					0.940**
					(8.88)
Strategy Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj R-squared	0.050	0.136	0.099	0.113	0.014
Panel B: Regressions with alphas averaged over the last 24 months					
FIRSTALPHA	0.005	0.269*	1.268**	1.800**	0.198*
	(0.39)	(2.58)	(3.07)	(4.01)	(2.39)
NFIRSTALPHA	0.019	0.371**	1.074	1.178	0.393*
	(1.82)	(3.11)	(1.69)	(1.92)	(2.62)
FUNDALPHA					0.886**
					(6.97)
Strategy Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj R-squared	0.046	0.134	0.106	0.117	0.013
Panel C: Regressions with alphas averaged over the last 36 months					
FIRSTALPHA	0.008	0.271*	1.322**	1.905**	0.263**
	(0.56)	(2.10)	(2.88)	(3.95)	(3.23)
NFIRSTALPHA	0.025*	0.333*	1.348*	1.174	0.451*
	(2.18)	(2.61)	(1.97)	(1.78)	(2.90)
FUNDALPHA					0.775**
					(5.89)
Strategy Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj R-squared	0.043	0.130	0.106	0.114	0.011

Table 3

Sorts on fund inception date

Every month, hedge funds are sorted based on their launch date within each hedge fund firm. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. The Fung and and Hsieh (2004) factors are S&P 500 return minus risk free rate (SNPMRF), Wilshire small cap minus large cap return (SCMLC), change in the constant maturity yield of the U.S. 10-year Treasury bond adjusted for the duration of the 10-year bond (BD10RET), change in the spread of Moody's BAA bond over 10-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. The t-statistics are derived from White (1980) standard errors. The sample period is from January 1994 to December 2013. Panel A reports results for the full sample of hedge funds while Panel B reports results for funds with AUM ≥ US$20m. * Significant at the 5% level; ** Significant at the 1% level.

Fund portfolio	Excess Ret. (pct/ year)	*t*-stat of excess return	Alpha (pct/ year)	*t*-stat of alpha	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	Adj. R^2
Panel A: Full fund sample												
Portfolio A (1st funds)	7.99**	5.75	5.28**	6.67	0.27**	0.15**	0.03	0.20**	-0.01	0.01**	0.00	0.70
Portfolio B (2nd to 5th funds launched)	6.35**	4.31	3.49**	3.56	0.26**	0.14**	0.08*	0.25**	-0.01	0.01**	0.00	0.61
Portfolio C (6th to 10th funds launched)	5.94**	3.61	2.84*	2.44	0.28**	0.13**	0.09*	0.28**	-0.01	0.01*	0.00	0.55
Portfolio D (11th to 20th funds launched)	5.20**	2.91	1.82	1.36	0.25**	0.14**	0.11*	0.34**	-0.02	0.01**	0.00	0.48
Spread (A - B)	1.63**	5.01	1.79**	5.68	0.01	0.01	-0.05**	-0.06**	0.00	-0.01**	-0.01	0.14
Spread (A - C)	2.04**	3.62	2.43**	4.39	-0.01	0.02	-0.06**	-0.09**	0.00	-0.01	-0.01	0.07
Spread (A - D)	2.79**	3.41	3.45**	4.29	0.02	0.01	-0.08*	-0.15**	0.01**	-0.01	0.00	0.07
Panel B: Funds with AUM ≥ US$20m												
Portfolio A (1st funds)	6.27**	4.37	3.44**	4.12	0.27**	0.17**	0.04	0.21**	-0.01	0.01*	0.00	0.69
Portfolio B (2nd to 5th funds launched)	5.02**	3.39	2.13*	2.14	0.24	0.14**	0.08*	0.28**	-0.01	0.01**	0.01	0.59
Portfolio C (6th to 10th funds launched)	4.31*	2.28	1.17	0.83	0.28	0.15**	0.09	0.30**	-0.01	0.02*	0.01	0.45
Portfolio D (11th to 20th funds launched)	2.61	1.48	-0.63	-0.47	0.23	0.15**	0.15**	0.32**	-0.02	0.02**	0.00	0.43
Spread (A - B)	1.24**	2.90	1.31**	3.23	0.02	0.03*	-0.04*	-0.08**	0.00	-0.01**	-0.01	0.16
Spread (A - C)	1.96*	1.96	2.27*	2.40	-0.02	0.02	-0.05	-0.09*	0.00	-0.02	-0.01	0.05
Spread (A - D)	3.66**	3.82	4.07**	4.46	0.03	0.02	-0.11**	-0.11**	0.00	-0.02**	0.00	0.06

Table 4

Regressions on hedge fund performance

OLS and Fama-Macbeth (1973) regressions are estimated on the cross-section of hedge fund performance. The dependent variable is hedge fund monthly return or alpha. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. FIRST is an indicator variable that takes a value of one when a fund is the first fund launched by a firm and a value of zero otherwise. CHRONO is fund launch order within the firm. SIZE is last month fund assets under management in US$m. MGTFEE is fund management fee in percentage. PERFFEE is fund performance fee in percentage. NOTICE is fund redemption notice period in months. AGE is fund age in decades. The regressions include controls for fund investment style fixed effects and year fixed effects (for the OLS regressions). The t-statistics are in parentheses. For the OLS regressions, they are derived from robust standard errors that are clustered by fund, while for the Fama-MacBeth regressions, they are derived from Newey and West (1987) standard errors with a three-month lag. The sample period is from January 1994 to December 2013. * Significant at the 5% level; ** Significant at the 1% level.

	Dependent variables							
	OLS		Fama-MacBeth		OLS		Fama-MacBeth	
Independent variables	Fund return	Fund alpha	Fund return	Fund alpha	Fund return	Fund alpha	Fund return	Fund alpha
FIRST	0.146**	0.157**	0.131**	0.140**				
	(10.22)	(10.97)	(7.33)	(8.14)				
CHRONO					-0.011**	-0.014**	-0.021**	-0.022**
					(-13.98)	(-16.51)	(-3.49)	(-4.90)
Log(SIZE)	-0.037**	-0.018**	-0.043**	-0.022**	-0.039**	-0.020**	-0.043**	-0.022**
	(-8.78)	(-4.25)	(-3.94)	(-2.65)	(-9.20)	(-4.62)	(-3.97)	(-2.69)
MGTFEE	0.033**	0.051**	0.037	0.054*	0.036**	0.057**	0.041	0.060**
	(2.81)	(4.16)	(1.68)	(2.51)	(3.11)	(4.66)	(1.84)	(2.77)
PERFFEE	0.009**	0.019**	0.008*	0.014**	0.008**	0.018**	0.007**	0.014**
	(7.56)	(14.53)	(2.30)	(5.99)	(6.91)	(13.81)	(2.25)	(5.97)
NOTICE	0.001**	0.001**	0.002**	0.002**	0.001**	0.001**	0.002**	0.002**
	(2.90)	(3.12)	(3.47)	(3.69)	(2.87)	(3.06)	(3.47)	(3.62)
AGE	-0.131**	-0.158**	-0.192**	-0.254**	-0.137**	-0.173**	-0.194**	-0.261**
	(-8.31)	(-9.87)	(-4.30)	(-5.56)	(-8.67)	(-10.69)	(-4.35)	(-5.70)
Strategy Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	No	No	Yes	Yes	No	No
Adj R-squared	0.028	0.012	0.088	0.051	0.028	0.012	0.089	0.052

Table 5

Sorts on number of funds launched and strategy correlation within firm

In Panels A and B, every month, hedge fund firms are sorted into five groups based on the number of funds previously launched by the firm. Portfolio 1 consists of firms which have only launched one fund. The rest of the firms are divided equally into the four remaining groups based on the number of funds launched. Portfolio 5 consists of the firms with the largest number of funds launched. In Panels C and D, every month, hedge fund firms are sorted into five groups based on the average pairwise correlation of the strategies of the funds launched by the firm. Portfolio I consists of firms that only engage in one strategy. The rest of the firms are divided equally into the four remaining groups based on the average pairwise correlation of the strategies engaged by the firm. Portfolio V consists of the firms with the most divergent strategies. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. The Fung and and Hsieh (2004) factors are S&P 500 return minus risk free rate (SNPMRF), Wilshire small cap minus large cap return (SCMLC), change in the constant maturity yield of the U.S. 10-year Treasury bond adjusted for the duration of the 10-year bond (BD10RET), change in the spread of Moody's BAA bond over 10-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. The t-statistics are derived from White (1980) standard errors. The sample period is from January 1994 to December 2013. In Panels A and C, firm returns are constructed by value-weighting returns across all funds within the firm. In Panels B and D, firm returns are constructed by equal-weighting returns across all funds within the firm. * Significant at the 5% level; ** Significant at the 1% level.

Hedge fund firm portfolio	Excess Ret. (pct/ year)	*t*-stat of excess return	Alpha (pct/ year)	*t*-stat of alpha	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	Adj. R^2
Panel A: Sort based on number of funds. Firm returns constructed from value-weighting fund returns												
Portfolio 1 (firms with one fund)	8.86**	6.44	6.24**	8.21	0.28**	0.16**	0.02	0.17**	-0.01	0.01**	0.00	0.72
Portfolio 2	6.78**	4.81	4.05**	4.76	0.27**	0.15**	0.04	0.22**	-0.01	0.01**	0.00	0.67
Portfolio 3	6.75**	5.24	4.52**	4.83	0.21**	0.12**	0.05	0.19**	-0.01	0.01**	0.01*	0.53
Portfolio 4	5.56**	4.06	3.02**	3.60	0.25**	0.15**	0.04	0.22**	0.00	0.01**	0.01	0.65
Portfolio 5 (firms with many funds)	5.11**	3.61	2.47*	2.38	0.24**	0.12**	0.11**	0.23**	-0.01	0.01**	0.01*	0.53
Spread (1 - 5)	3.74**	7.32	3.77**	7.96	0.04**	0.04**	-0.09**	-0.06**	0.00	-0.01*	-0.01*	0.25
Panel B: Sort based on number of funds. Firm returns constructed from equal-weighting fund returns												
Portfolio 1 (firms with one fund)	8.97**	6.43	6.26**	8.29	0.28**	0.17**	0.03	0.17**	-0.01	0.01**	0.00	0.73
Portfolio 2	7.13**	5.06	4.35**	5.22	0.27**	0.15**	0.04	0.22**	-0.01	0.01**	0.00	0.68
Portfolio 3	7.12**	5.58	4.85**	5.41	0.22**	0.12**	0.05	0.19**	-0.01	0.01**	0.01	0.55
Portfolio 4	6.09**	4.38	3.40**	4.13	0.27**	0.15**	0.05	0.22**	-0.01	0.01**	0.01	0.68
Portfolio 5 (firms with many funds)	5.20**	3.66	2.44*	2.48	0.25**	0.13**	0.10**	0.24**	-0.01	0.01**	0.01	0.58
Spread (1 - 5)	3.76**	8.27	3.81**	9.02	0.03**	0.03**	-0.07**	-0.07**	0.00	-0.01*	-0.01	0.24
Panel C: Sort based on strategy correlation within firm. Firm returns constructed from value-weighting fund returns												
Portfolio I (firms with one strategy)	8.95**	6.46	6.31**	8.35	0.28**	0.16**	0.02	0.17**	-0.01	0.01**	0.00	0.73
Portfolio II	6.22**	4.92	4.90**	4.38	0.14**	0.09**	0.08*	0.13*	0.00	0.02**	0.02**	0.34
Portfolio III	6.49**	4.43	4.02**	3.51	0.21**	0.13**	0.09*	0.28**	-0.01	0.02**	0.01*	0.46
Portfolio IV	5.82**	4.09	3.14**	3.13	0.23**	0.12**	0.07*	0.23**	-0.01	0.01**	0.00	0.54
Portfolio V (firms with uncorrelated strategies)	4.74**	3.96	2.61**	2.79	0.19**	0.07**	0.09**	0.21**	-0.01	0.01**	0.01*	0.47
Spread (I - V)	4.21**	6.51	3.70**	7.18	0.09**	0.09**	-0.07**	-0.05	0.00	-0.01	-0.01	0.46
Panel D: Sort based on strategy correlation within firm. Firm returns constructed from equal-weighting fund returns												
Portfolio I (firms with one strategy)	9.06**	6.45	6.33**	8.42	0.29**	0.17**	0.03	0.18**	-0.01	0.01**	0.00	0.74
Portfolio II	6.69**	5.42	5.21**	4.89	0.15**	0.10**	0.07	0.16**	0.00	0.02**	0.02**	0.37
Portfolio III	6.50**	4.56	4.00**	3.69	0.21**	0.12**	0.09*	0.28**	-0.01	0.02**	0.01	0.49
Portfolio IV	6.13**	4.18	3.34**	3.35	0.25**	0.13**	0.07*	0.23**	-0.01	0.01**	0.00	0.57
Portfolio V (firms with uncorrelated strategies)	5.02**	4.15	2.70**	3.05	0.20**	0.08**	0.09**	0.21**	-0.01	0.01**	0.01	0.53
Spread (I - V)	4.04**	7.09	3.63**	8.14	0.08**	0.08**	-0.07**	-0.04	0.00	-0.01	-0.01	0.46

Table 6

Regressions on hedge fund performance with firm variables

OLS and Fama-Macbeth (1973) regressions are estimated on the cross-section of hedge fund performance. The dependent variable is hedge fund monthly return or alpha. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. NFUNDS is the number of funds launched by the firm. STRATCORR is the average pairwise correlation of the strategies that the fund's firm engages in. FIRST is an indicator variable that takes a value of one when a fund is the first fund launched by a firm and a value of zero otherwise. SIZE is last month fund assets under management in US$m. MGTFEE is fund management fee in percentage. PERFFEE is fund performance fee in percentage. NOTICE is fund redemption notice period in months. AGE is fund age in decades. The regressions include controls for fund investment style fixed effects and year fixed effects (for the OLS regressions). The t-statistics are in parentheses. For the OLS regressions, they are derived from robust standard errors that are clustered by fund, while for the Fama-MacBeth regressions, they are derived from Newey and West (1987) standard errors with a three-month lag. The sample period is from January 1994 to December 2013. * Significant at the 5% level; ** Significant at the 1% level.

	Dependent variables							
	OLS		Fama-MacBeth		OLS		Fama-MacBeth	
Independent variables	Fund return	Fund alpha	Fund return	Fund alpha	Fund return	Fund alpha	Fund return	Fund alpha
NFUNDS	-0.006**	-0.009**	-0.009*	-0.011**				
	(-10.45)	(-13.85)	(-2.12)	(-3.81)				
STRATCORR					0.268**	0.267**	0.274**	0.244**
					(4.85)	(4.62)	(3.21)	(4.02)
FIRST	0.103**	0.096**	0.089**	0.083**	0.109**	0.120**	0.095**	0.104**
	(6.93)	(6.43)	(5.33)	(5.35)	(6.75)	(7.37)	(4.73)	(5.74)
Log(SIZE)	-0.037**	-0.017**	-0.041**	-0.02*	-0.036**	-0.017**	-0.041**	-0.020*
	(-8.64)	(-4.04)	(-3.78)	(-2.42)	(-8.36)	(-3.82)	(-3.79)	(-2.41)
MGTFEE	0.037**	0.057**	0.041	0.061**	0.033**	0.051**	0.038	0.054*
	(3.15)	(4.71)	(1.85)	(2.78)	(2.82)	(4.16)	(1.69)	(2.47)
PERFFEE	0.008**	0.017**	0.007*	0.014**	0.009**	0.019**	0.007*	0.014**
	(6.67)	(13.53)	(2.15)	(5.80)	(7.37)	(14.43)	(2.20)	(5.88)
NOTICE	0.001**	0.001**	0.002**	0.001**	0.001**	0.001**	0.002**	0.002**
	(2.73)	(2.91)	(3.29)	(3.40)	(2.78)	(3.02)	(3.30)	(3.52)
AGE	-0.130**	-0.156**	-0.181**	-0.241**	-0.126**	-0.153**	-0.187**	-0.249**
	(-8.26)	(-9.83)	(-4.13)	(-5.43)	(-8.09)	(-9.65)	(-4.11)	(-5.39)
Strategy Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	No	No	Yes	Yes	No	No
Adj R-squared	0.028	0.012	0.089	0.053	0.028	0.012	0.089	0.051

Table 7
Event study with differences-in-differences analysis

This table reports results from an event study analysis of first fund attributes around the launch of the first follow-on fund by the same hedge fund firm. First funds are the first funds launched by each hedge fund firm. The fund attributes analyzed include fund return, alpha, and AUM. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. Event month is the month that the first follow-on fund is launched. The period "before" is the 36-month period before the event month and the period "after" is the 36-month period after the event month. To be included in the analysis, a first fund must survive at least 24 months before and after the event month. Funds in the control group are matched to funds in the treatment group based on fund return, alpha, or AUM in the 24-month pre-event period. For example, in the fund return analysis, funds in the control group are matched to funds in the treatment group by minimizing the sum of the absolute differences in monthly fund return in the 24-month pre-event period. The t-statistics are derived from White (1980) standard errors. The sample period is from January 1994 to December 2013. * Significant at the 5% level; ** Significant at the 1% level.

	Before	After	Difference (after - before)	*t*-statistic of difference
Panel A: First fund return				
Fund return (pct / month) - treatment group	1.41	0.81	-0.60**	-13.17
Fund return (pct / month) - control group	1.17	0.72	-0.45**	-9.83
Difference in return (pct / month)	0.25	0.09	-0.16**	-4.24
Panel B: First fund alpha				
Fund alpha (pct / month) - treatment group	0.90	0.46	-0.45**	-11.27
Fund alpha (pct / month) - control group	0.64	0.35	-0.29**	-7.52
Difference in alpha (pct / month)	0.26	0.10	-0.16**	-4.36
Panel C: First fund AUM				
Fund AUM (US$m) - treatment group	140.31	245.93	105.62**	59.97
Fund AUM (US$m) - control group	137.90	217.31	79.41**	59.77
Difference in AUM (US$m)	2.41	28.61	26.21**	14.16

Table 8

Regressions on first follow-on and first fund returns

OLS regressions are estimated on the first follow-on fund and first fund performance just after the inception of the first follow-on fund. The dependent variables include first follow-on fund abnormal return (NFIRSTALPHA) and first fund abnormal return (FIRSTALPHA) averaged over the 12-month, 24-month, or 36-month period post follow-on fund inception. Fund abnormal returns are measured relative to the Fung and Hsieh (2004) 7-factor model. FIRSTALPHA is first fund alpha averaged over the 12-month or 24-month period just prior to first follow-on fund inception. NFIRSTSIZE is follow-on fund assets under management at inception in US$m. NFIRSTMGTFEE is follow-on fund management fee in percentage. NFIRSTPERFFEE is follow-on fund performance fee in percentage. NFIRSTNOTICE is follow-on fund redemption notification period in months. FIRSTSIZE is first fund assets under management at first follow-on fund inception in US$m. FIRSTMGTFEE is first fund management fee in percentage. FIRSTPERFFEE is first fund performance fee in percentage. FIRSTNOTICE is first fund redemption notification period in months. The multivariate regressions include controls for fund investment style and follow-on fund inception year fixed effects. The t-statistics, derived from robust standard errors that are clustered by firm, are in parentheses. The sample period is from January 1994 to December 2013. * Significant at the 5% level; ** Significant at the 1% level.

	Dependent variables											
	NFIRSTALPHA						FIRSTALPHA					
Independent variables	12-month horizon		24-month horizon		36-month horizon		12-month horizon		24-month horizon		36-month horizon	
FIRSTALPHA	0.136**	0.093**	0.107**	0.062*	0.057*	0.035	0.126**	0.107**	0.097**	0.076*	0.104**	0.095**
	(3.73)	(2.65)	(3.83)	(2.55)	(2.56)	(1.56)	(3.33)	(2.75)	(3.36)	(2.50)	(3.92)	(3.55)
log(NFIRSTSIZE)		-0.119**		-0.105**		-0.080**						
		(-2.98)		(-3.59)		(-3.13)						
NFIRSTMGTFEE		0.103		0.137		0.051						
		(0.88)		(1.52)		(0.63)						
NFIRSTPERFFEE		0.035**		0.029**		0.012						
		(3.21)		(3.74)		(1.90)						
NFIRSTNOTICE		0.003		0.002		0.002						
		(1.46)		(1.66)		(1.32)						
log(FIRSTSIZE)								-0.056		-0.065*		-0.042
								(-1.77)		(-2.52)		(-1.91)
FIRSTMGTFEE								0.003		0.031		0.027
								(0.04)		(0.45)		(0.42)
FIRSTPERFFEE								0.011		0.003		-0.001
								(1.17)		(0.44)		(-0.09)
FIRSTNOTICE								0.002		0.002		0.001
								(1.01)		(0.97)		(0.76)
Strategy Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Adj R-squared	0.030	0.089	0.028	0.122	0.008	0.085	0.026	0.067	0.018	0.069	0.023	0.062

Table 9

Regressions on first fund flow

Regressions are estimated on the flow of the first funds managed by each hedge fund firm. For each firm, we distinguish between the first fund launched and other follow-on funds. The dependent variable is first fund flow (FIRSTFLOW). The independent variables include FIRSTALPHA, and NFIRSTALPHA, where FIRSTALPHA is first fund abnormal return averaged over the last x months, and NFIRSTALPHA is the average abnormal return of the follow-on funds within the same firm averaged over the last x months. The regressions include controls for fund investment style and year fixed effects. The t-statistics, derived from robust standard errors that are clustered by firm, are in parentheses. In panels A, B, and C, the lookback period x equals 12, 24, and 36 months, respectively. The sample period is from January 1994 to December 2013. * Significant at the 5% level; ** Significant at the 1% level.

Independent variables	Dependent variable FIRSTFLOW
Panel A: Regressions with past 12-month alpha	
FIRSTALPHA	0.878**
	(13.21)
NFIRSTALPHA	0.154**
	(3.22)
Strategy Fixed Effects	Yes
Year Fixed Effects	Yes
Adj R-squared	0.012
Panel B: Regressions with past 24-month alpha	
FIRSTALPHA	0.966**
	(10.69)
NFIRSTALPHA	0.185**
	(3.31)
Strategy Fixed Effects	Yes
Year Fixed Effects	Yes
Adj R-squared	0.010
Panel C: Regressions with past 36-month alpha	
FIRSTALPHA	1.014**
	(9.92)
NFIRSTALPHA	0.102
	(1.78)
Strategy Fixed Effects	Yes
Year Fixed Effects	Yes
Adj R-squared	0.008

Table 10

Robustness tests

Every month, hedge funds are sorted based on their launch date within each hedge fund firm. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. The Fung and and Hsieh (2004) factors are S&P 500 return minus risk free rate (SNPMRF), Wilshire small cap minus large cap return (SCMLC), change in the constant maturity yield of the U.S. 10-year Treasury bond adjusted for the duration of the 10-year bond (BD10RET), change in the spread of Moody's BAA bond over 10-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. Panel A reports results adjusted for backfill bias by removing the return observations before fund listing date. Panel B reports results after unsmoothing returns using the Getmansky, Lo, and Makarov (2004) algorithm. Panel C reports results after adding back fees to form pre-fee returns. Panel D reports results adjusted for dynamic risk exposures by using a rolling 36-month window to calculate factor loadings. Panel E reports results after augmenting the Fung and Hsieh (2004) model with the MSCI Emerging Market Index excess return. Panel F reports results after augmenting the Fung and Hsieh (2004) model with the Agarwal and Naik (2004) out-of-the-money call and put option factors. Panel G reports results after augmenting the Fung and Hsieh (2004) model with the Pástor and Stambaugh (2003) liquidity factor. Panel H adjusts for fund termination by assuming that a fund delivers a -10 percent return for the month after it stops reporting returns. Panels I and J report results for two sub-sample periods: January 1994 to December 2003 and January 2004 to December 2013, respectively. The t-statistics are derived from White (1980) standard errors. The sample period is from January 1994 to December 2013. * Significant at the 5% level; ** Significant at the 1% level.

Portfolio	Excess Return (pct / year)	*t*-stat of excess return	Alpha (pct / year)	*t*-stat of alpha	Portfolio	Excess Return (pct / year)	*t*-stat of excess return	Alpha (pct / year)	*t*-stat of alpha
Panel A: Adjusted for backfill bias					*Panel F: Fung and Hsieh (2004) model augmented with out-of-the-money call and put option factors*				
Portfolio A (1st funds)	7.30**	4.81	4.26**	5.32	Portfolio A (1st funds)	7.99**	5.75	5.14**	6.40
Portfolio B (2nd to 5th fund launched)	5.95**	4.09	3.05**	3.41	Portfolio B (2nd to 5th fund launched)	6.35**	4.31	3.33**	3.31
Portfolio C (6th to 10th fund launched)	5.09**	3.39	2.20*	2.01	Portfolio C (6th to 10th fund launched)	5.94**	3.61	2.77*	2.28
Portfolio D (11th to 20th fund launched)	2.02	0.97	-1.62	-0.97	Portfolio D (11th to 20th fund launched)	5.20**	2.91	1.53	1.06
Spread (A - D)	5.28**	4.14	5.88**	4.49	Spread (A - D)	2.79**	3.41	3.61**	4.16
Panel B: Adjusted for serial correlation					*Panel G: Fung and Hsieh (2004) model augmented with the Pástor and Stambaugh (2003) liquidity factor*				
Portfolio A (1st funds)	7.97**	5.25	4.99**	5.73	Portfolio A (1st funds)	7.99**	5.75	4.94**	6.24
Portfolio B (2nd to 5th fund launched)	6.37**	3.96	3.20**	3.03	Portfolio B (2nd to 5th fund launched)	6.35**	4.31	3.08**	3.10
Portfolio C (6th to 10th fund launched)	5.97**	3.29	2.51	1.95	Portfolio C (6th to 10th fund launched)	5.94**	3.61	2.31*	1.96
Portfolio D (11th to 20th fund launched)	5.25**	2.60	1.50	0.97	Portfolio D (11th to 20th fund launched)	5.20**	2.91	1.38	1.00
Spread (A - D)	2.72**	2.84	3.49**	3.70	Spread (A - D)	2.79**	3.41	3.56**	4.24
Panel C: Pre-fee returns					*Panel H: Adjusted for fund termination*				
Portfolio A (1st funds)	12.52**	8.87	9.79**	12.10	Portfolio A (1st funds)	6.86**	4.96	4.19**	5.32
Portfolio B (2nd to 5th fund launched)	10.32**	6.92	7.44**	7.50	Portfolio B (2nd to 5th fund launched)	5.15**	3.53	2.34*	2.40
Portfolio C (6th to 10th fund launched)	9.48**	5.71	6.36**	5.41	Portfolio C (6th to 10th fund launched)	4.78**	2.94	1.72	1.50
Portfolio D (11th to 20th fund launched)	8.17**	4.55	4.77**	3.52	Portfolio D (11th to 20th fund launched)	4.34*	2.45	0.99	0.75
Spread (A - D)	4.35**	5.28	5.01**	6.17	Spread (A - D)	2.51**	3.09	3.19**	4.00
Panel D: Adjusted for dynamic risk exposures using 36-month rolling betas					*Panel I: Sub-sample analysis (January 1994 - December 2003)*				
Portfolio A (1st funds)	7.97**	5.00	5.01**	5.30	Portfolio A (1st funds)	8.88**	5.19	6.49**	7.77
Portfolio B (2nd to 5th fund launched)	6.32**	3.82	2.97**	2.67	Portfolio B (2nd to 5th fund launched)	7.11**	4.08	4.84**	4.59
Portfolio C (6th to 10th fund launched)	5.91**	3.21	2.60	1.90	Portfolio C (6th to 10th fund launched)	6.68**	3.36	4.22**	3.12
Portfolio D (11th to 20th fund launched)	5.28*	2.62	1.76	1.14	Portfolio D (11th to 20th fund launched)	4.94**	2.78	3.11*	2.37
Spread (A - D)	2.68**	2.99	3.24**	3.62	Spread (A - D)	3.93**	3.83	3.37**	3.76
Panel E: Fung and Hsieh (2004) model augmented with an emerging markets equity factor					*Panel J: Sub-sample analysis (January 2004 - December 2013)*				
Portfolio A (1st funds)	7.99**	5.75	5.78**	8.86	Portfolio A (1st funds)	7.10**	3.24	3.85**	3.00
Portfolio B (2nd to 5th fund launched)	6.35**	4.31	4.08**	4.96	Portfolio B (2nd to 5th fund launched)	5.59*	2.35	2.02	1.30
Portfolio C (6th to 10th fund launched)	5.94**	3.61	3.58**	3.77	Portfolio C (6th to 10th fund launched)	5.21*	1.98	1.40	0.77
Portfolio D (11th to 20th fund launched)	5.20**	2.91	2.54*	2.19	Portfolio D (11th to 20th fund launched)	5.45	1.76	0.99	0.44
Spread (A - D)	2.79**	3.41	3.23**	4.21	Spread (A - D)	1.65	1.30	2.85*	2.28

Internet Appendix: Hedge Fund Franchises

Table A1

Regressions on hedge fund performance

OLS and Fama-Macbeth (1973) regressions are estimated on the cross-section of hedge fund performance for funds stratified by personal capital. The dependent variable is hedge fund monthly return or alpha. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. FIRST is an indicator variable that takes a value of one when a fund is the first fund launched by a firm and a value of zero otherwise. CHRONO is fund launch order within the firm. SIZE is last month fund assets under management in US$m. MGTFEE is fund management fee in percentage. PERFFEE is fund performance fee in percentage. NOTICE is fund redemption notice period in months. AGE is fund age in decades. The OLS regressions include controls for fund investment style and year fixed effects. The t-statistics are in parentheses. For the OLS regressions, they are derived from robust standard errors that are clustered by fund, while for the Fama-MacBeth regressions, they are derived from Newey and West (1987) standard errors with a three-month lag. Columns one to four report coefficient estimates from regressions on funds with personal capital. Columns five to eight report coefficient estimates from regressions on funds without personal capital. The sample period is from January 1994 to December 2013. * Significant at the 5% level; ** Significant at the 1% level.

	Funds with personal capital				Funds with no personal capital			
	OLS		Fama-MacBeth		OLS		Fama-MacBeth	
Independent variables	Fund return	Fund alpha	Fund return	Fund alpha	Fund return	Fund alpha	Fund return	Fund alpha
FIRST	0.040	0.018	0.107*	0.039	0.120**	0.114**	0.155**	0.123**
	(0.77)	(0.34)	(2.07)	(1.06)	(3.50)	(3.26)	(3.25)	(3.13)
Log(SIZE)	-0.052**	-0.024	-0.050*	-0.021	-0.026**	-0.002	-0.036*	-0.012
	(-3.70)	(-1.64)	(-2.45)	(-1.46)	(-2.69)	(-0.11)	(-2.08)	(-0.96)
MGTFEE	0.074	0.110*	0.025	0.101*	-0.004	-0.006	0.005	0.004
	(1.40)	(2.23)	(0.38)	(2.14)	(-0.19)	(-0.33)	(0.11)	(0.14)
PERFFEE	0.010*	0.019**	0.004	0.015**	0.013**	0.019**	0.004	0.007**
	(1.98)	(3.88)	(0.72)	(2.77)	(6.61)	(9.29)	(1.75)	(3.10)
NOTICE	0.004**	0.003**	0.004**	0.003**	0.004**	0.004**	0.006**	0.006**
	(5.07)	(4.28)	(3.25)	(3.22)	(5.80)	(6.85)	(5.34)	(5.33)
AGE	-0.151*	-0.242**	-0.160	-0.260**	-0.053	-0.082*	-0.143	-0.260**
	(-2.51)	(-4.05)	(-1.94)	(-5.02)	(-1.38)	(-2.14)	(-1.91)	(-4.07)
Strategy Fixed Effects	Yes	Yes	No	No	Yes	Yes	No	No
Year Fixed Effects	Yes	Yes	No	No	Yes	Yes	No	No
Adj R-squared	0.025	0.009	0.028	0.017	0.034	0.024	0.038	0.032

Table A2

Fund of hedge funds sorted on past fund alpha t-statistics

Every January 1st, fund of hedge funds (FoFs) are sorted based on their alpha t-statistics estimated over the last 24 months. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. The Fung and and Hsieh (2004) factors are S&P 500 return minus risk free rate (SNPMRF), Wilshire small cap minus large cap return (SCMLC), change in the constant maturity yield of the U.S. 10-year Treasury bond adjusted for the duration of the 10-year bond (BD10RET), change in the spread of Moody's BAA bond over 10-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. In Panel A, we evaluate performance in the post formation period with the Fung and Hsieh (2004) model. In Panel B, we evaluate performance in the post formation period with the Fung and Hsieh (2004) model augmented with HFCHRONO, which is the difference between the return on the portfolio of first hedge funds and the return on the portfolio of follow-on hedge funds. First hedge funds are the first funds launched by each hedge fund firm. All other hedge funds are classified as follow-on funds. The t-statistics are derived from White (1980) standard errors. The sample period is from January 1994 to December 2013. * Significant at the 5% level; ** Significant at the 1% level.

Fund of hedge funds portfolio	Excess Ret. (pct/ year)	*t*-stat of excess return	Alpha (pct/ year)	*t*-stat of alpha	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	HFCHRONO	Adj. R^2
Panel A: Fung and Hsieh (2004) model													
Portfolio 1 (high past alpha t-statistics)	7.11**	4.73	4.55**	4.24	0.17**	0.10*	0.07	0.32**	-0.01	0.00	0.00		0.47
Portfolio 2	5.27**	3.44	2.58*	2.23	0.19**	0.15**	0.11*	0.24**	-0.01	0.00	0.01		0.47
Portfolio 3	4.23*	2.37	1.00	0.74	0.23**	0.15**	0.15**	0.30**	-0.01	0.00	0.01		0.46
Portfolio 4	3.21	1.69	-0.44	-0.33	0.27**	0.15**	0.15**	0.29**	-0.02*	0.00	0.01		0.52
Portfolio 5	3.29	1.81	-0.18	-0.14	0.25**	0.13**	0.12**	0.30**	-0.02**	0.00	0.00		0.52
Portfolio 6	2.59	1.48	-0.81	-0.65	0.25**	0.13**	0.13**	0.28**	-0.02**	0.01	0.00		0.53
Portfolio 7	3.17	1.88	0.16	0.14	0.25**	0.11**	0.08*	0.24**	-0.02*	0.01*	0.00		0.52
Portfolio 8	4.06*	2.32	1.31	1.01	0.25**	0.12**	0.04	0.22**	-0.01	0.01	0.00		0.46
Portfolio 9	2.57	1.50	-0.09	-0.07	0.22**	0.12**	0.04	0.22**	-0.02	0.01	0.00		0.42
Portfolio 10 (low past alpha t-statistics)	0.79	0.46	-1.77	-1.33	0.25**	0.12**	0.02	0.14**	-0.02	0.01	0.00		0.44
Spread (Portfolio 1 - 10)	6.31**	4.59	6.31**	4.79	-0.09**	-0.02	0.04	0.18*	0.00	-0.01	0.00		0.03
Panel B: Fung and Hsieh (2004) augmented with HFCHRONO factor													
Portfolio 1 (high past alpha t-statistics)	7.11**	4.73	6.40**	5.68	0.17**	0.11*	0.01	0.26**	-0.01	0.00	0.00	-0.96**	0.54
Portfolio 2	5.27**	3.44	4.56**	4.18	0.19**	0.16**	0.05	0.17**	-0.01	0.00	0.01*	-1.03**	0.54
Portfolio 3	4.23*	2.37	3.98**	3.52	0.23**	0.16**	0.06	0.20**	-0.01	0.00	0.01**	-1.55**	0.58
Portfolio 4	3.21	1.69	3.05**	2.68	0.27**	0.16**	0.05	0.17**	-0.01	0.00	0.01**	-1.82**	0.67
Portfolio 5	3.29	1.81	2.87*	2.47	0.25**	0.15**	0.03	0.20**	-0.02	0.00	0.01	-1.59**	0.64
Portfolio 6	2.59	1.48	2.23*	1.97	0.25**	0.14**	0.04	0.18**	-0.02*	0.00	0.00	-1.58**	0.66
Portfolio 7	3.17	1.88	3.04**	2.92	0.25**	0.13**	0.00	0.15**	-0.01	0.01*	0.00	-1.50**	0.65
Portfolio 8	4.06*	2.32	4.19**	3.64	0.25**	0.13**	-0.05	0.12*	-0.01	0.01	0.00	-1.50**	0.58
Portfolio 9	2.57	1.50	3.16**	2.87	0.22**	0.14**	-0.06	0.11*	-0.01	0.00	0.00	-1.69**	0.58
Portfolio 10 (low past alpha t-statistics)	0.79	0.46	1.17	1.05	0.26**	0.13**	-0.07	0.04	-0.01	0.00	0.00	-1.53**	0.57
Spread (Portfolio 1 - 10)	6.31**	4.59	5.22**	4.03	-0.09**	-0.03	0.08	0.22*	0.00	-0.01	0.00	0.56*	0.06

Table A3

Instrumental variables analysis

This table reports results from 2SLS regressions that use an instrumental variable (IV) approach to examine whether the observed differences in hedge fund performance between funds that differ in their chronological launch order within firms reflect unobserved differences that endogenously determine fund launch order. Our instrument for fund launch order exploits the cross sectional differences in hedge fund managers' ability to accumulate capital at the time of founding. We define hedge fund management company founding strategy fund flow (STRATEGYFLOW) as strategy flow over the 12-month period prior to fund management company inception. The strategy used in STRATEGYFLOW corresponds to the investment strategy of the first fund launched by the firm. Columns 1 shows the first stage probit model of first fund status on hedge fund management company founding strategy fund flow (STRATEGYFLOW) and the group of control variables used in Table 4. The dependent variable is the first fund dummy (FIRST). It takes a value of one when a fund is the first fund launched by a firm and a value of zero otherwise. The independent variables include the natural logarithm of hedge fund size (log(SIZE)) where SIZE is in USD million, management fee (MGTFEE), performance fee (PERFFEE), redemption notice period in months (NOTICE), fund age in decades (AGE) as well as dummy variables for year and fund investment strategy. Following Wooldridge (2010), the second stage is estimated by 2SLS using as instruments the first-stage predicted probability. Columns 2 and 3 show the second stage results, where the dependent variables are RETURN and ALPHA. RETURN is hedge fund monthly net-of-fee return. ALPHA is Fung and Hsieh (2004) seven-factor monthly alpha. Column 4 shows the first stage OLS regression of fund chronology on hedge fund management company founding strategy fund flow (STRATEGYFLOW) and the group of control variables used in Table 4. The dependent variable is CHRONO or fund launch order within the firm. Columns 5 and 6 show the second stage results, where the dependent variables are RETURN and ALPHA. The z-statistics, in parentheses, are derived from robust standard errors that are clustered by fund. The R-squareds are omitted as the R-squared has no statistical meaning in the context of 2SLS/IV. The sample period is from January 1994 to December 2013. * Significant at the 5% level; ** Significant at the 1% level.

	Dependent variables					
	FIRST	RETURN	ALPHA	CHRONO	RETURN	ALPHA
Independent variables	IV first stage (probit)	IV second stage	IV second stage	IV first stage (OLS)	IV second stage	IV second stage
FIRST		1.286**	1.408**			
		(2.97)	(3.44)			
CHRONO					-0.014**	-0.016**
					(-2.77)	(-3.18)
Log(SIZE)	-0.067**	-0.015	0.012	0.110**	-0.045**	-0.021**
	(-7.80)	(-1.20)	(0.97)	(3.46)	(-9.54)	(-4.55)
MGTFEE	-0.005	0.075**	0.080**	0.332*	0.077**	0.083**
	(-0.18)	(4.19)	(4.37)	(1.96)	(5.30)	(5.76)
PERFFEE	0.015**	0.002	0.013**	-0.123**	0.008**	0.019**
	(5.88)	(0.67)	(4.13)	(-8.77)	(4.78)	(11.29)
NOTICE	0.004**	0.000	0.000	-0.022**	0.002*	0.002**
	(7.23)	(0.00)	(0.39)	(-4.88)	(2.29)	(2.76)
AGE	0.743**	-0.519**	-0.541**	-3.89**	-0.229**	-0.226**
	(17.28)	(-4.33)	(-4.76)	(-24.76)	(-7.98)	(-7.79)
STRATEGYFLOW	-0.420**			8.01**		
	(-4.53)			(11.54)		
F -test: STRATEGYFLOW = 0	20.52**			133.17**		
Strategy Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes